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ABSTRACT

This booklet provides a brief overview of ideas, facts, and resources offered during a summer institute hosted by the Partnership for Academic and Career Education (PACE). Section 1 contains summaries of four industry tours taken by institute participants. Section 2 describes two technology demonstrations at Tri-County Technical College. Section 3 contains summaries of institute presentations on these topics: multidisciplinary art class project, PACE, the South Carolina Occupational Information System, identifying and serving at-risk students in the classroom, National Dropout Prevention Center, Competing in a World Economy: America's Workforce Challenges; Motivational Thinking: A Key to Academic and Career Success; Self-Esteem: The Transferable Skill--A Workshop for Educators; nontraditional careers panel; gender fairness; and Anderson County Business and Education Partnership. Section 4 provides a summary of the projects designed by the 1992 Summer Institute participants. A list is presented of 32 resources provided to participants over the course of the institute or referenced by institute presenters. Selected participant comments are provided. Appendixes include the activities schedule, brochure, participant list, and sample materials given to participants (fact sheets, articles, brochures, and booklets covering integrating vocational and academic integration, women in technology, and tech prep). (YLB)

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PARTNERSHIP FOR ACADEMIC
AND CAREER EDUCATION

SUMMER INSTITUTE

92

JUNE
15 - 26

RESOURCE HANDBOOK FOR TEACHERS AND COUNSELORS

*...a collection of ideas, facts, resources,
and project summaries from the
1992 PACE Summer Institute*

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June, 1992

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INTRODUCTION

The Partnership for Academic and Career Education's sixth annual Summer Institute, funded through a Carl D. Perkins grant awarded to PACE by the State Department of Education, Office of Vocational Education, was conducted at Tri-County Technical College June 15-26, 1992. Nineteen teachers and counselors from Oconee, Pickens, and Anderson counties participated.

PACE Summer Institute participants receive a participant manual to use during the Institute. In addition to course and scheduling information, the participant manual serves as an additional collection of diverse resources for participants to use in classroom applications. Included are numerous fact sheets, articles, brochures and booklets covering such areas as integrating vocational and academic curricula, women in technology and Tech Prep.

One of the Institute's goals was to inform participants about mid-level technology careers and other nontraditional fields open to students and to recommend strategies to prepare students for these rewarding and lucrative careers. The Institute also focused on improving all students' motivation and self-esteem.

To meet these goals, participants in this year's Institute took part in a variety of activities including industry tours and presentations, lab demonstrations, and discussions led by Institute staff. They also participated in a two-day program entitled "Self-Esteem--The Transferable Skill."

On completion of all scheduled activities and submission of a project, participants were awarded 3 semester hours for the institute course--Psychology of Individual Achievement (PSY 222). Projects were designed to follow up one or more topics raised during the Institute, implementing appropriate activities to enhance teaching or counseling approaches in the coming school year.

This booklet provides a brief overview of ideas, facts, and resources offered during the 1992 Summer Institute. **APPENDIX A** includes the Institute schedule. **APPENDIX B** provides a descriptive brochure and list of Institute participants, staff, and presenters. **APPENDIX C** contains a sampling of the handouts given to Institute participants.

For additional information on any topic addressed by the Institute, or on plans for the 1993 Summer Institute, contact:

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INDUSTRY TOURS

Michelin Tire Corporation, US 2

Michelin's US 2 plant, "Where Quality Begins," was completed in 1973 in Sandy Springs, South Carolina. The plant produces rubber compounds, tissue, and other tire components to be shipped to other Michelin manufacturing plants in Dothan, Alabama; Greenville, South Carolina; Spartanburg, South Carolina; and Lexington, South Carolina. The US 2 plant, which employs approximately 1200, produces all the tissue used in North American operations.

Bob Rawley, plant manager, and Grover Stewart, employee relations manager, explained that Michelin Tire Corporation is looking for some specific basic skills in any prospective employee. Basic math skills,including both arithmetic and algebra, are important to most jobs at the plant. Written communication skills are critical; employees must be able to write accurately and legibly. Oral communication and teamwork skills are some of the most important tools any employee can possess. Employees need to be able to react quickly and solve problems together. In addition, they need to be able to listen and explain information thoroughly, to analyze, interpret, and communicate data effectively.

Torrington Manufacturing

Started in the 1860's to manufacture sewing machine needles, Torrington has now grown to be the largest manufacturer of bearings in the United States and the second largest worldwide. The company also manufactures other precision metal parts under different names including steering mechanisms for automobiles, computer components, and surgical equipment. Some new products include ceramic bearings and sensor bearings. The plant located in West Union primarily manufactures thrust bearings for GM automobiles. The plant employs approximately 300 people, half males and half females. The line is largely automated, with a Statistical Process Control system used by the operators.

Jim Smith, personnel director, emphasized that Torrington is committed to further education for its employees. Employees work on problem-solving teams to make various recommendations throughout the plant. Before working on a team, however, they take a class on Total Quality Management and Quality Skills. The company provides a full-time instructor on-site with a master's degree in math to teach classes for employees wishing to upgrade their skills. Torrington looks for good math and communications skills in their prospective employees, and they would like to see high school students developing better problem-solving skills.

Bosch Corporation

Tom Barilovics led the tour of the new ceramic manufacturing and electronic relay assembly departments of the Bosch assembly plant. Located in Anderson, the plant currently employs approximately 500 employees, producing components like the antilock braking system. Bosch is the world's largest privately owned automotive supply company. Begun in 1886 in Stuttgart, Germany, the company originally had three employees making ignition components. Bosch opened his first U.S. office in New York in 1906. Today, the company employs 5000 U.S. employees in 16 locations.

Worldwide, Bosch employs approximately 166,000 people and has diversified into such areas as home appliances, satellites, power tools, industrial electronics components, and robotic systems. Products made at the Anderson plant, opened in 1985, include fuel rails, fuel tank kits, oxygen sensors for injection systems, ABS systems, and wheel speed sensors. Any potential employee of Bosch is required to pass a three-month electronics course before he or she will be hired.

Operators are encouraged to pursue further studies through the apprenticeship program or through classes at local colleges. If they pass the courses with a "C" or better, 100 percent of their expenses will be paid for by the company. Recognizing the implications of the coming labor shortage, Bosch is already investigating attractive benefits like on-site daycare and recreation packages to compete for the best potential employees.

Cannon Memorial Hospital

Cannon Memorial is a small hospital in Pickens that has been renovated and is striving for the latest in technology.

Cannon Memorial's chief administrator, Jim Uzzell, human relations director, Debbie Trammell, director of nursing, Nancy Miles, and an anesthetist all gave presentations and conducted tours of the hospital facility. Institute participants were also shown a video of the newest technology in laproscopic gall bladder surgery performed at Cannon. Participants were made acutely aware of the competitiveness of the medical field and the new emphasis on hiring medical personnel and other hospital staff who possess good human relation skills.

TECHNOLOGY DEMONSTRATIONS AT TRI-COUNTY TECHNICAL COLLEGE

Electronics Engineering Technology

Mr. Ron Talley, department head, described the Electronics Engineering Technology program as a rigorous one that produces somewhere between ten and twenty graduates per year. Students tend to sort themselves out early in the program due to approximately 20 hours spent in class per week and 20 hours of outside work in addition. Electronics engineering technicians typically take engineers' designs, construct models, and do research and testing. They may also find themselves in installation and maintenance positions.

Students in the program are able to use equipment at Tri-County Technical College to learn to troubleshoot circuits. The college works closely with NCR, which donates spare parts for the students to work on. Upon completion of the program, students typically have their choice of jobs ranging in salary from $20-25,000 per year. The young women who complete the program generally do very well since women are often well-suited to such detailed work.

Machine Tool Technology

John Norris, instructor, described how Eli Whitney actually began the craft of tool and die making when he created an assembly line process to make precision rifle parts. Later this industry became even more sophisticated as a result of Henry Ford's production techniques. As industries continue to automate more and more of their assembly processes, the demand for trained machine tool technicians will increase. Students who wish to enter this field must have good planning and creative skills. They must also be able to think independently and use good math skills.

Students in the tri-county area have a unique opportunity to take advantage of the Bosch apprenticeship program, which allows students to work at Bosch and take classes to earn an Associate of Industrial Technology degree from Tri-County Technical College. While students still learn to use the manual lathes and mills, computer-driven CNC machines are replacing manual skills with thinking skills needed to do calculations and program these sophisticated precision systems.

INSTITUTE PRESENTATIONS

Project Presentation

As a participant in the 1991 Summer Institute, Ron Mattox, art teacher at Belton Middle School, developed a multi-discipline teaching unit for his sixth grade art classes this past year. Ron's students researched (through social studies classes) a WW II plane, wrote numerous letters seeking information about the plane (English classes), drew building plans for the plane to scale (Math classes), gathered tools and materials and constructed a replica of the plane in Ron's art classes. This was a project that the entire school was proud and excited to be involved in, and Ron is already planning a similar project for the next school year.

Partnership for Academic and Career Education (PACE)

Anita Turlington, Tri-County Technical College, Tech Prep Coordinator, explained that the workplace is changing significantly, and those changes are having an impact on the way we educate high school students. The new careers are mid-level positions requiring flexibility, diversity, and a team approach. Mrs. Turlington explained that these mid-level careers are characterized by

- a wide range of responsibilities;
- good salaries;
- good potential for advancement.

They require one to two years of postsecondary education, problem-solving and communications skills, and they are becoming more plentiful. These jobs are not only in technical fields but also in business, public service, and medical areas as well.

To prepare students for these careers, says Mrs. Turlington, teachers must begin to stress such areas as strong math and communications skills, critical thinking, problem-solving, and learning to learn. The students who are most likely to be potential technicians are the 75 percent who are not in college prep but in general and vocational education courses. The PACE partnership was formed to meet this challenge of preparing students for these new mid-level technology careers through the implementation of Tech Prep (PREParation for TECHnologies) programs. Working with the school districts in the tri-county area, area businesses, the National Dropout Prevention Center at Clemson, and Tri-County Technical College, the PACE staff works with faculty, administrators, and counselors to develop Tech Prep programs adapted to fit the unique needs of the seven area school districts. The goals of Tech Prep are to

- reduce the dropout rate;
- increase math, science, and English skills through the use of applied academics;
- blend academic and vocational studies;

- improve students' readiness for work;
- increase numbers in postsecondary education;
- increase opportunities for tuition aid;
- increase the number of skilled workers for area businesses in mid-level technology positions.

The South Carolina Occupational Information System (SCOIS).

Johnny Wallace, PACE associate director/curriculum developer, explained that SCOIS is operated jointly by the South Carolina Department of Education and the South Carolina Job Service. There are nine types of information provided through SCOIS: occupational (career) information; information on job openings available through the local job service; description of postsecondary private vocational schools in South Carolina; a listing of the graduate programs offered in the various colleges in the state; news about the state's economy; listing of applicants seeking positions in South Carolina schools; information regarding sources of financial aid for postsecondary education; general information about workshops of interest to public school personnel and a weekly news bulletin published by the State Department of Education.

The option of most interest to students is the Coordinated Occupational Information Network (COIN). COIN allows students to broadly research careers by interests, career clusters, educational requirements and salary range among others. Specific career information includes a career profile, work-related duties, working conditions, employment outlook, colleges offering related majors, level of education required and additional sources of information.

The other area of interest to students is financial aid. This option gives steps to financial aid, types of sources, questions and answers, the types available at specific colleges, and private sources.

Identifying and Serving At-Risk Students in the Classroom

Sandy Addis, Director of Special Projects for Anderson School District One, reviewed the dropout problems in the area, state, and nation. Dropout rates from 1986 to 1991 were compared. The characteristics of at-risk students and the most common reasons for premature school exit were discussed.

Procedures for identifying dropout from students at various grade levels were discussed. Institute participants participated in an identification exercise using the Phi Delta Kappa "Student Survey for At-Risk Indicators." The group concluded that most causes and indicators of dropping out are social, personal, and home-based rather than academic and that at-risk students require personal services and intervention by a "significant other" prior to academic remediation.

Tools for diagnosing individual student at-risk conditions were reviewed. Participants analyzed sample scores on the Piers-Harris Children's Self-Concept Scale and discussed the most appropriate intervention strategies for those students. Discussion, supplemented by literature and replication manuals, on specific intervention strategies gave participants information on tutoring, mentoring, individual counseling, and reward programs. The presentation concluded with a question and answer session which focused on application of presentation context to individual student projects and classroom use.

National Dropout Prevention Center at Clemson University

Linda Shirley, special projects director, reported that approximately twenty-five percent of South Carolina's adult population has no more than an eighth grade education. In 1988, 7,466 students in South Carolina high schools dropped out of school. In response to the state crisis and national statistics that are equally alarming, the National Dropout Prevention Center was formed as a partnership between Clemson University and the National Dropout Prevention Fund. The Center advocates a systematic approach to understanding this complex problem and designing effective solutions. Five areas are embraced by the approach of restructuring schooling processes, forming public-private partnerships between schools and communities, identifying at-risk youth, increasing access to education and employment, and heightening public consciousness. To achieve these goals, the center offers the following services:

- assisting development of public-private partnerships;
- providing information and resources to individuals and groups;
- cooperating with state and local lawmakers;
- providing newsletters and other publications; and
- providing use of the FOCUS database, which contains hundreds of model dropout prevention program abstracts.

Competing in a World Economy: America's Workforce Challenges

Neil Lark, an instructor with Tri-County Technical College's World Class Training Center, discussed changes taking place in businesses and industries in our area as a result of competition in a global marketplace. The "just in time" approach to production and the new emphasis placed on teamwork are innovations that are powerfully affecting the workplace. Students need to practice critical thinking, problem-solving strategies and teamwork while in school in order to be prepared for this new workplace environment. Employees in typical businesses and industries will no longer be isolated, but will need good interpersonal skills to be successful.

Motivational Thinking: A Key to Academic and Career Success

Dr. Mike Collins led institute participants through analysis of personal reasons for choosing a career in education and through exercises and activities which gave each student awareness of individual job benefits. After participants identified personal job satisfaction needs, they analyzed their individual job benefits through exercises and activities.

Dr. Collins used humor, personal anecdotes, and research data to help participants identify the most valuable and most difficult elements of their jobs. Students were led through a process by which they developed individually appropriate strategies for positively dealing with the difficult people and situations of their jobs.

The presentation concluded with a review of workplace positives and negatives, leaving institute participants with the conclusion that their jobs had been selected to match individual needs, that each job represented or contained numerous desirable qualities, and that each educator holds the power for maximum enjoyment of his or her job.

Self-Esteem: The Transferable Skill--A Workshop for Educators

Butch Merritt, career counselor at Tri-County Technical College, conducted sessions on building self-esteem. Low self-esteem is the number one problem among adults and adolescents today. Although our self-esteem is defined as what we think of ourselves and how much we value ourselves, our self-esteem is shaped from the time we are very young by the experiences we have and the way we are conditioned by others' comments. Low self-esteem in adolescence and adulthood is a major contributing factor in child abuse, drug abuse, and alcoholism. Less dramatically, it can also cause difficulty in forming relationships, career problems, and various neuroses. Low self-esteem can also be a contributing factor to females failing to pursue lucrative careers in nontraditional fields.

Although our self-esteem has been formed throughout life, we can, with patience, improve the way we think and feel about ourselves. We can identify the influential people in our lives and choose positive instead of negative role models to emulate. We can access the characterization of ourselves that we live with day by day and begin to make positive changes slowly and deliberately. Once we have set goals for improving our self-esteem, we must listen to the way we talk about ourselves and choose positive ways to talk that will help us confidently claim the goals and keep them in our minds. If we choose realistic, incremental goals and give ourselves positive self-talks, we can mold positive and confident self-images instead of defeated negative ones. We can shape our unconscious thinking about ourselves so that it will help us to be successful. If educators can learn these concepts and techniques themselves, they will then be able to pass on the same skills to their students.

Nontraditional Careers Panel

A panel of students and graduates in nontraditional career fields discussed issues related to their chosen careers. The panel included four females currently working as or studying to be electrical or mechanical technicians. All were presently participating in or had a unique cooperative education experience sponsored by the Robert Bosch Corporation in Anderson and Tri-County Technical College.

Each panelist reflected on past experiences (both positive and negative) which helped guide her career decisions. They also shared their feelings on being in a field dominated by the opposite sex. Several made suggestions on how teachers and counselors could help other students learn about and prepare for nontraditional careers.

Institute participants asked questions and several interesting discussions resulted from the presentation.

Panel participants were Ms. Julie Borders, Sheila Chappell, Mrs. Kathleen McAlhaney and Ms. Lisa Rhodes.

Gender Fairness

Anita Turlington, Tech Prep Coordinator at Tri-County Technical College, discussed the concerns that educators face today in treating male and female students fairly. Educators and parents are still generally reluctant to encourage students into nontraditional courses and career training. This reluctance may be changing slowly. However, although girls entering technical classes and fields are increasingly better accepted, boys are still discouraged from taking traditionally female courses like cooking and cosmetology. This is true even though some of the nation's most highly paid chefs and hairdressers are men. Curriculum materials, too, often are discriminatory in presenting only stereotyped depictions of males and females. Educators may even be inadvertently showing discrimination in the classroom through different expectations and treatment of students based on gender. To meet these problems, educators should carefully examine the curriculum materials they use as well as their own attitudes for gender discrimination.

Anderson County Business And Education Partnership

Jane Cahaly, Director of the Anderson County Business And Education Partnership, discussed the benefits of partnerships between schools and businesses. Partnerships set up by ACBEP are set up as one-on-one relationships between businesses and schools and function on many levels. She emphasized the growing desire of local businesses and industries to be involved in public education and their willingness to contribute not only money, but time, people and facilities as well. She also spoke of how these partnerships could benefit educators in motivating their students and obtaining community support for innovative ideas and programs. She encouraged Institute participants to become involved more actively with their business partners, to express to those partners the needs of the school, and to make a commitment to try to understand better the needs of local business and industry partners as well.

PARTICIPANT PROJECTS

Listed below is a summary of the projects designed by the 1992 Summer Institute participants. Participants received assistance in data base searches, graphics design of brochures and posters, and identification of resources from Institute and College staff members. Each Institute participant will implement his or her project during the 1992-93 academic year and will complete a follow-up survey in March of 1993 to assess the project's success.

A teacher designed a teaching module for secondary students on "Developing Your Own Business."
This module is designed "to encourage students to think nontraditionally about career options, to equip students with viable hands-on skills, to engender in students a belief that nothing is impossible, to demonstrate to students the applied usage of other subject areas--English, Math, Psychology..., to develop a strong atmosphere of teamwork and responsibility, and to create a desire for excellence."

A teacher designed a multitude of activities for use in building self-esteem and promoting teamwork among elementary age youngsters.
"To remain globally competitive, it is no longer possible for employees to park their brains (as well as bored souls) at the door when commencing work. However, a person with low self-esteem will be reluctant to take the chance... Those individuals with a strong sense of self will be more willing to work with others to accomplish a common goal."

A sixth grade teacher developed a project to motivate and excite children and provide a way to apply the skills they have learned in school.
Students will work in teams to learn the culture of earthworms both for bait and for the compost they produce. Students will use language arts skills, math skills, science, social studies, and art in this team building, career awareness project.

A senior high English teacher developed a teaching unit on teamwork as related to Chaucer's "The Pardoner's Tale."
Students will read "The Pardoner's Tale" by Geoffrey Chaucer and identify problems that prevented the team from working together. This teacher believes that "relating a literary piece to the idea of teamwork and group participation is a very practical approach to the topic of working together and cooperatively."

A driver's education teacher planned a unit on exploring driving careers.
Students will use SCOIS to explore a career in driving, write a business letter requesting information, do an oral presentation to share information with classmates, hear speakers actively involved with the driving careers, and have an opportunity to shadow someone in a driving career.

A fashion and garment design instructor from an area career center developed a presentation demonstrating various skills necessary for success in the marketplace.
Those skills include computation, reading, communications, teamwork, creative thinking and problem solving.

A high school English teacher developed a project for her class to work together interviewing professionals in various careers.
"Students will learn how to work with classmates and develop interpersonal relationships, organize and evaluate data, and learn about technology."

A middle school counselor developed materials for an advisor/advisee program.
She states that "a student entering middle school for the first time needs to feel a sense of belonging and of being able to form bonds with teachers and classmates. Every student needs at least one thoughtful adult who has the time and makes the effort to talk with him or her about academic matters, personal problems, and the importance of performing well in school."

A high school business education teacher developed a reference booklet for student use in conducting a job search and in developing employability skills. "It is the role of the vocational teacher to provide the related classroom instruction that students need to anticipate and better understand the situations and attitudes that they will encounter on their jobs."

A cosmetology instructor developed a career guide entitled "Cosmetology: Then and Now."
"Times have changed--technology has changed--the hair/beauty industry has changed." Students will learn the importance of related subjects such as psychology of interpersonal skills in retailing, anatomy, dermatology, chemistry, electricity, math and bookkeeping.

Two high school math teachers developed activities and a pre-employment test "to make students more aware of the math skills they should possess in order to be considered for employment in the ever changing job market."
"After touring several industries in our area, we realized that many of our students and teachers are probably unaware of the pre-employment requirements for entry level positions in today's industry."

A middle school teacher will acquaint students with different careers during a seventh-period advisor-advisee program.
"Through this project, sixth grade students will realize the importance of studying English; for, in all careers, oral and written communication skills are required."

A high school business education teacher will have students develop a "computer career guide" that they along with future students may use in a possible career selection.
"It is my purpose to excite and motivate my students through the information that they discover and to possibly give them some direction..."

A participant developed an educational toy, "If I Had A Hammer..." for girls and boys between the ages of 6 and 9.
"The thesis behind the toy is that if children, especially girls, are introduced to hand tools and experience success in their use at an early age, then they are more likely to be favorably disposed to mechanics as a hobby or career."

A high school business education teacher developed a unit to "direct students in a search for the information necessary to make the choices which will reflect their interests, abilities, and assist in reaching their employment goals."
The project "requires research or investigation of an occupation or career choice concluding with a 'shadow' or 'mentor' experience in a field of student's choice."

RESOURCES

Most of the resources below were provided to participants over the course of the 1992 Summer Institute. In some cases, particular articles or books were referenced by Institute presenters and, therefore, are also included in this list.

A Proud Heritage - Key to the Future, South Carolina Department of Education, 1985-86 Mini-Plan for Vocational Education.

America's Shame, America's Hope, Twelve Million Youth at Risk, Charles Stewart Mott Foundation, 1988.

"Dropouts Pay Penalties," *The State*, June 27, 1989.

"High-tech Industries Change Upstate Vocational Education," *Anderson Independent Mail*, January 22, 1989.

Changing America: The New Face of Science and Engineering, Interim Report, The Task Force on Women, Minorities, and the Handicapped in Science and Technology, September, 1988.

Changing Images: Career Models in the 80's, Women's Development Center, Greenville Technical College, Greenville, S.C.

Fulghum, Robert, *All I Really Need to Know I Learned in Kindergarten*, Villard Books, 1988.

Garner, Brian, "Tech Prep Program Helps Find a Use for Algebra," *Clemson Messenger*, January 20, 1989.

Guide to Area Business Speakers, Partnership for Academic and Career Education, February , 1990.

Guskey, Thomas R., "Every Teacher Can Be the Best," *Vocational Education Journal*, Jan/Feb, 1989, pp. 20-22.

Hamby, John V., "A Series of Solutions and Strategies," National Dropout Prevention Center at Clemson University, Number 1, May 1989.

Hull, Daniel M. and Prescott, Carolyn A., *High Technology Careers: A Guide for Counselors*, The Center for Occupational Research and Development, Waco, Texas, August, 1984.

Larson, Robert, "*Tech Prep Mode to Overcoming Obsolescence*," *Michigan Business*, March, 1989, p. 72.

Meek, Ann, "On Creating Ganas: A Conversation with Jaime Escalante," *Educational Leadership*, February, 1989, pp. 46-47.

Mensel, Frank and Reinhard, Bill, "Perkins Applied Technology Act and Ford Tech-Prep Act Sail Through the House of Representatives," *Times*, AACJC, Volume 1, Number 11, May 23, 1989.

Naisbitt, John and Aburdene, Patricia, *Re-inventing the Corporation*. New York: Warner, 1985

National Dropout Prevention Center Newsletter, Quarterly Publication of the National Dropout Prevention Center at Clemson University, Volume 2, Number 3, Summer 1989.

Occupational Outlook Quarterly, "Projections 2000," Volume 31, Number 3, Fall 1987.

Ostrander, Sheila and Schroeder, Lynn, Super-learning. New York: Dell Publishing, 1979.

Parnell, Dale, The Neglected Majority. The Community College Press, 1985.

Perry, Nancy J., "The New, Improved Vocational School," Fortune, June 19, 1989.

Rosenfield, Stuart A., "Educating for Our Factories of the Future," Business and Economic Review, April-June 1989, pp. 39-40.

Rowe, John R., et al. The New Model Me, Second Ed. New York: Teachers College Press, 1983.

Rubin, Nancy, "Math Stinks," Parents, June, 1988, pp. 132-135, 206-208, 212.

S.C. Network, A Publication of the National Dropout Prevention Center at Clemson University, Volume 1, Number 3, Summer 1989.

"The Forgotten Half," U.S. News and World Report, June 26, 1989, pp. 45-53.

The Southeast 21st Challenge, U.S. Department of Labor, 1989.

Training America: Learning to Work for the 21st Century. American Society for Training and Development, 1989.

Waitley, Dennis, Self-Esteem: The Transferable Skill, Advanced Learning Consultants, 1989.

Wenzell, Ron, "School Optimistic About Tech Programs Future," The State, June 10, 1989.

Workforce 2000: Work and Workers in the 21st Century, Hudson Institute, June, 1987.

1989 Career Planning and Job Search Catalog, JIST Works Inc., 1988

SELECTED COMMENTS FROM THE 1992 SUMMER INSTITUTE

The comments below were offered by participants in their project summaries or in the evaluation surveys completed at the conclusion of the two-week institute.

"I enjoyed the informal atmosphere which was conducive to getting to know other teachers in a more personal way."

"The tours of the industries made me more aware of how little I know about today's job market. It's very hard to talk about careers with my students when I really don't even know what's available myself."

"The self-esteem activities will be most helpful to me. I want to pass this material on to the teachers at my school plus I want to be more positive in dealing with teachers and students."

"This course challenged my perceptions."

"A well integrated combination of field and lecture activities."

"ALL parts of the **PACE SUMMER INSTITUTE** were invaluable and it is hard to rate one activity as having greater merit than another."

"I can honestly say that the program was so well planned that all parts will be of great value as I prepare and rearrange my coursework for the coming year."

APPENDICES

APPENDIX A

PARTNERSHIP FOR ACADEMIC AND CAREER EDUCATION (PACE)

1992 SUMMER INSTITUTE

SCHEDULE

Week 1
Monday, June 15
LRC 245

8:30 - 9:00	Welcome/Announcements	Dr. Karen Woodward Diana Walter
9:00 - 9:30	Overview of Class/Requirements	Martha Robinette
9:30 - 10:30	Project Presentation	Ronald Mattox Rick Murphy
10:30 - 10:45	Break	
10:45 - 12:00	Campus Resources to Support Summer Institute Projects	Laurel Horton
12:00 - 1:00	Lunch (on your own)	
1:00 - 2:00	PREParation for TECHnologies: Issues for Access and Equity	Diana Walter
2:00 - 2:30	SCOIS/Other Research Resources	Johnny Wallace

Tuesday, June 16

8:30 - 12:00	Cannon Memorial Hospital	Jim Uzzell
12:00 - 1:00	Lunch (on your own)	
1:00 - 2:30	Competing in a World Economy: America's Workforce Challenges	Neil Lark

Week 1 (Continued)

Wednesday, June 17

8:30 - 12:00	Robert Bosch Corporation	Mark Warner
12:00 - 1:00	Lunch (on your own)	
1:00 - 2:30	Motivational Thinking: A Key to Academic and Career Success	Mike Collins

Thursday, June 18

8:30 - 1:00	Michelin Tire Corporation (includes lunch)	Grover Stewart
1:00 - 2:00	Opportunities in Electronic Engineering Technology	Ron Talley
2:00 - 2:30	Opportunities in Industrial Mechanics Technology	Gene Kesterson

Friday, June 19

8:30 - 12:00	Project Conferences	Martha Robinette
12:00 -	Individual Work on Projects	

Week 2
Monday, June 22

8:30 - 12:30	Torrington--West Union	Jim Smith
12:30 - 1:30	Lunch (on your own)	
1:30 - 2:30	Networking and Business-Education Partnerships	Jane Cahaly

Tuesday, June 23

8:30 - 12:30	Self-Esteem: The Transferable Skill--A Workshop for Educators	Butch Merritt
12:30 - 1:30	Lunch (on your own)	
1:30 - 2:30	Opportunities in Machine Tool Technology	Curt McKinney

Wednesday, June 24

8:30 - 12:30	Self-Esteem, Part II	Butch Merritt
12:30 - 1:30	Lunch (on your own)	
1:30 - 2:30	The SCANS Report: What Does It Mean?	Johnny Wallace

Thursday, June 25

8:30 - 9:45	Gender Fairness: Preparing Students for Non-Traditional Careers	Anita Turlington
9:45 - 10:00	Break	
10:00 - 11:00	Non-Traditional Careers Panel	

Week 2 (Continued)

11:00 - 12:00	Counseling Strategies: Its Everyone's Business	Wayne Pendergrass Rick Murphy
12:00 - 1:00	Lunch (on your own)	
1:00 - 1:30	National Dropout Prevention Center	Linda Shirley
1:30 - 2:30	Identifying and Serving At-Risk Students in the Classroom	Sandy Addis

Friday, June 26

8:30 - 12:00	Project Presentations
12:00 - 1:30	Lunch
1:30 - 2:30	Wrap-up and Evaluation

DEADLINE FOR ENROLLMENT
IS MAY 15.
For more information, call:
Donna Branham
PACE secretary (Ext. 2107)
646-8361 882-4412
225-2250 859-7033

Application

To preregister, please complete this application and mail before May 15 to:

Donna Branham, PACE secretary
P.O. Box 587, Pendleton, SC 29670

Name ______________________________
First Middle Last

Social Security Number ______________________

Title ______________________________
(Include subject areas and grade levels, if teaching)

____

School ______________________________

School address ______________________________

____

Home address ______________________________

____

Home phone ______________________________

The comments below were offered by participants in their project summaries or in the evaluation surveys completed at the conclusion of the two-week institute.

“I was amazed at the techniques used in industry; all of the 'high tech' equipment really woke me up to what we should be teaching in the classroom and how we can bridge the gap between the classroom and the world of work."

"The project gives us an opportunity to utilize resources and materials not always available to us."

"Through the industry tours, I have become more aware of the need for career planning."

"The Institute is the best-kept secret in the tri-county area! ”

PACE

P.O. Box 587
Pendleton, SC 29670

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PACE

Partnership for Academic and Career Education
and
Tri-County Technical College

SUMMER INSTITUTE

92

JUNE
15-26

Information you can really use to help your students understand technology careers!

“This was by far one of the best– if not the best–course I have ever taken.”

BEST COPY AVAILABLE

Summer Institute: Technical and Industrial Career Opportunities for Women in the Tri-County Area

Offered by:
The Partnership for Academic
and Career Education

June 15-26, 1992
8:30 a.m. - 2:30 p.m.
Tri-County Technical College Campus

Anderson, Oconee, and Pickens counties are among the fastest growing areas in South Carolina. New businesses and industries locating in our area, and changes in existing industries, have brought career opportunities that didn't exist just a few years ago.

As a teacher or counselor, it's important that you know about careers available to your students and the preparation they need to enter the workforce in these new, more technical jobs. Because we recognize that this information is not easily available, PACE's sixth annual SUMMER INSTITUTE offers you field trips to local industries, demonstration tours, presentations by business leaders and much more!

How will the SUMMER INSTITUTE help you?

The SUMMER INSTITUTE will help you obtain information by

- increasing your awareness of technical and industrial career opportunities, especially for females, in the tri-county area;
- increasing your knowledge of academic and technical preparation your students need for entry into technology careers;
- increasing your understanding of gender fairness in the curriculum, in textbooks and course materials, and in teaching strategies; and
- helping you develop strategies to improve students' self-concepts, encourage goal-setting and self-discipline, and increase motivation.

What will you study?

Through this intensive two-week course, you will learn about

- existing and emerging careers in technology,
- the Tech Prep (PREParation for TECHnologies) program,
- gender fairness in the secondary school curriculum, and
- strategies that boost students' self-esteem and motivation through the newly revised Psychology of Winning series "Self-Esteem: The Transferable Skill."

What will you do?

Your awareness of career opportunities in the technologies, and the skills needed for success, will be strengthened through such activities as

- field trips to local industries for first-hand observation of manufacturing operations,
- demonstration tours through technical labs of Tri-County Technical College,
- presentations by business and industry leaders, technology instructors, and successful men and women in technical careers, and
- participation in the video series "Self-Esteem: The Transferable Skill–A Program for Educators," a program focusing on self-improvement and motivation.

What type of credit will you earn?

On completion of the Institute course, PSY 222-Psychology of Individual Achievement, you will be awarded 3 semester hours of credit. Participants may apply to the State Department of Education for recertification credit in the following categories:

- Specific Content/Methods (for individuals certified in psychology, social studies, and guidance) or
- Nature of Teaching/Learning (for individuals certified in other areas).

When and where will the SUMMER INSTITUTE be offered?

The Institute will meet **June 15-26 (Monday through Friday), from 8:30 a.m. - 2:30 p.m.**, for a total of ten class periods. Classes will be held on the **Tri-County Technical College campus.**

You can participate tuition-free!

Through a Carl D. Perkins grant awarded to PACE by the State Department of Education's Office of Occupational Education, tuition costs and instructional materials will be fully covered for 20 participants.

Who may attend?

Because of growing interest in the PACE Summer Institute, participants will be accepted in the order described below.

- First priority will be given to presently certified and employed teachers and counselors in middle, junior high, high schools, alternative schools, and career centers in Anderson, Oconee and Pickens counties.
- Second priority will be given to presently certified, but not presently employed (e.g. a teacher on leave of absence for current academic year but returning in upcoming year), teachers and counselors in middle, junior high, high schools, alternative schools and career centers in Anderson, Oconee and Pickens counties;
- Third priority will be given to presently certified and employed teachers and counselors in middle, junior high, high schools, alternative schools and career centers in other South Carolina counties; and
- Last priority will be given to other interested persons willing to pay their own costs should spaces, up to the enrollment limit of 20, be available.

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1992 PACE Summer Institute

Participant List

Mr. James E. Addis
Instructor/Physical Education
Pendleton High School
P.O. Box 218
Pendleton, SC 29670

Ms. Ann W. Berry
Guidance Counselor
Belton Middle School
102 Cherokee Road
Belton, SC 29627

Ms. Eddye C. Free
Instructor/Language Arts
Seneca Middle School
P.O. Box 607
Seneca, SC 29678

Ms. Cynthia T. Garrison
Instructor/Math
Pendleton High School
P.O. Box 218
Pendleton, SC 29670

Ms. Sharon D. Green
Instructor/Business
West-Oak High School
130 Warrior Lane
Westminster, SC 29693

Ms. Doris P. Harbin
Instructor/Math
Pendleton High School
P.O. Box 218
Pendleton, SC 29670

Ms. JaneAnn D. Hinchman
Instructor/Math
T.L. Hanna High School
2123 Marchbanks Avenue
Anderson, SC 29621

Mr. Charles Holstead
Instructor/History
D.W. Daniel High School
1819 Six Mile Highway
Central, SC 29630

Ms. Nellie W. Johnson
Instructor/Business
Crescent High School
P.O. Box 88
Iva, SC 29655

Ms. Fain R. Kapeluck
Instructor/6th Grade
East End Elementary School
505 E. 2nd Avenue
Easley, SC 29640

1992 PACE Summer Institute Participants (Continued)

Ms. Pat B. Land
P.O. Box 1736
Seneca, SC 29678

Mr. Richardson L. Lathem
Placement/Co-Op Coordinator
B.J. Skelton Career Center
1400 Griffin Mill Road
Easley, SC 29640

Ms. Ann J. Parnell
Instructor/Cosmetology
McDuffie High School
1225 S. McDuffie Street
Anderson, SC 29624

Mr. Henry D. Poore
Instructor/English
Palmetto High School
P.O. Box 429
Williamston, SC 29697

Ms. Claire Smith
Guidance Counselor
507 Blume Road
Anderson, SC 29625

Ms. Denise C. Trufan
104 Wood Duck Road
Anderson, SC 29621

Ms. Florence Turner
Instructor/Fashion Merchandising
B.J. Skelton Career Center
1400 Griffin Mill Road
Easley, SC 29640

Ms. Linda Turner
Instructor/English
Easley High School
P.O. Box 129
Easley, SC 29640

Ms. Jean H. Vinson
Instructor/Business Education
The Career Center
702 Belton Highway
Williamston, SC 29697

PARTNERSHIP FOR ACADEMIC AND CAREER EDUCATION
SUMMER INSTITUTE 1992

STAFF/PRESENTERS

Sandy Addis, Director of Special Projects, Anderson School District One (847-7344)

Tom Barilovics, Ceramic Engineer, Robert Bosch Corporation (260-8000)

Julie Borders, Bosch Apprentice, Robert Bosch Corporation (260-8000)

Donna Branham, Secretary, Partnership for Academic and Career Education (PACE) (646-8361 ext. 2107)

Jane Cahaly, Executive Director, Anderson County Business and Education Partnership (224-0773)

Sheila Chappell, Bosch Apprentice, Robert Bosch Corporation (260-8000)

Dr. Mike Collins, Consultant, Performance Management Company (292-1643)

Laurel Horton, Information Access Librarian, Tri-County Technical College (646-8361 ext. 2391)

Gene Kesterson, Department Head, Industrial Mechanics, Tri-County Technical College (646-8361 ext. 2183)

Neil Lark, World Class Manufacturing Coordinator/Instructor, Tri-County Technical College (646-8361 ext. 2208)

Ron Mattox, 1991 Summer Institute Participant & Instructor, Belton Middle School (338-6595)

Robbye Mauldin, Executive Vice President, Tri-County Technical College (646-8361 ext. 2105)

Kathleen McAlhaney, Bosch Apprentice, Robert Bosch Corporation (260-8000)

Curt McKinney, Department Head, Machine Tool Technology, Tri-County Technical College (646-8361 ext. 2272)

Butch Merritt, Counselor, Tri-County Technical College (646-8361 ext. 2166)

Nancy Miles, Director of Nursing, Cannon Memorial Hospital (878-4791)

Rick Murphy, Director of Cooperative Education, Tri-County Technical College & Counselor Liaison, Partnership for Academic and Career Education (PACE) (646-8361 ext. 2381)

John Norris, Instructor, Machine Tool Technology, Tri-County Technical College (646-8361 ext. 2392)

Wayne Pendergrass, Director of Guidance, Liberty High School (843-9224)

Bob Rawley, Plant Manager, Michelin Tire Corporation (260-2006)

Lisa Rhodes, Bosch Apprentice, Robert Bosch Corporation (260-8000)

Martha Robinette, Institute Coordinator, Department Head, Office Systems Technology, Tri-County Technical College (646-8361 ext. 2171)

Linda Shirley, Director, Special Projects, National Dropout Prevention Center at Clemson University (868-3475)

Jim Smith, Personnel Director, Torrington Manufacturing, West Union (638-3683)

Grover Stewart, Employee Relations Manager, Michelin Tire Corporation (260-2006)

Ron Talley, Department Head, Electronics Engineering Technology, Tri-County Technical College (646-8361 ext. 2278)

Debbie Trammell, Human Relations Director, Cannon Memorial Hospital (878-4791)

Anita Turlington, Tech Prep Coordinator, Tri-County Technical College (646-8361 ext. 2137)

Jim Uzzell, Chief Administrator, Cannon Memorial Hospital (878-4791)

Johnny Wallace, Associate Director/Curriculum Developer, Partnership for Academic and Career Education (PACE) (646-8361 ext. 2247)

Diana Walter, Executive Director, Partnership for Academic and Career Education (PACE) (646-8361 ext. 2378)

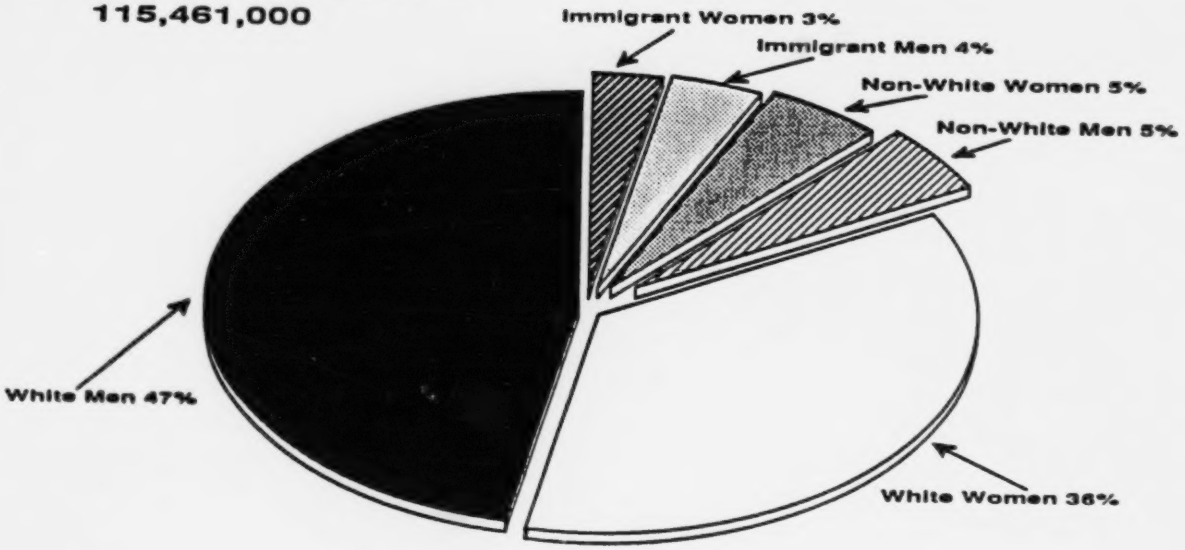
Mark Warner, Human Resources Manager, Robert Bosch Corporation (260-8000)

Dr. Jim Wood, Division Chairman, Industrial Engineering Technology, Tri-County Technical College (646-8361 ext. 2176)

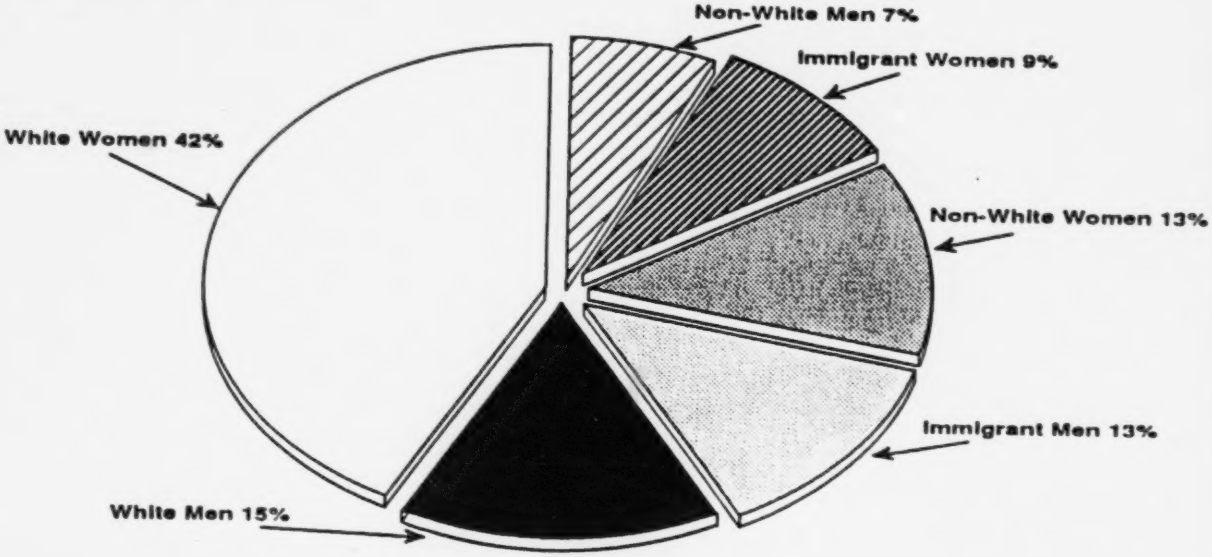
APPENDIX C

Changing Labor Force

1985 LABOR FORCE
115,461,000



NET NEW WORKERS, 1985-2000
25,000,000



Changing demographics will markedly affect the composition of the future workforce. Of the net workers entering the labor force by the year 2000, only 15 percent will be white men, and the rest either white women, members of minority groups, or immigrants.

Source: U.S. Department of Labor

Some Comparative Statistics

Average wage in Upstate South Carolina
Source: South Carolina Wage Survey, 1989-1990
South Carolina Employment Security Commission

	Avg. Hourly Earnings
Accountants, Auditors and Budget Analysts	$ 14.05
* Auto Mechanics	$ 12.30
Carpenters	$ 14.78
Counter and Retail Clerks	$ 6.30
* Electrical and Electronic Technicians	$ 13.22
File Clerks	$ 8.19
* Heating, A/C and Refrigeration Mechanics	$ 15.74
Mail Clerks	$ 8.20
Medical & Psychological Social Workers	$ 10.27
Personnel and Labor Relations Specialists	$ 12.23
* Registered Nurse	$ 16.00
Social Workers except Medical & Psychological	$ 7.09
Speech Pathologists and Audiologists	$ 10.35
* Tool & Die Makers	$ 12.53
Waiters and Waitresses	$ 3.33

(To calculate hourly wage into an annual wage, multiply hourly salary by 2080 hours per year. For example, Registered Nurses making $16.00 per hour would earn approximately $33,280 per year.)

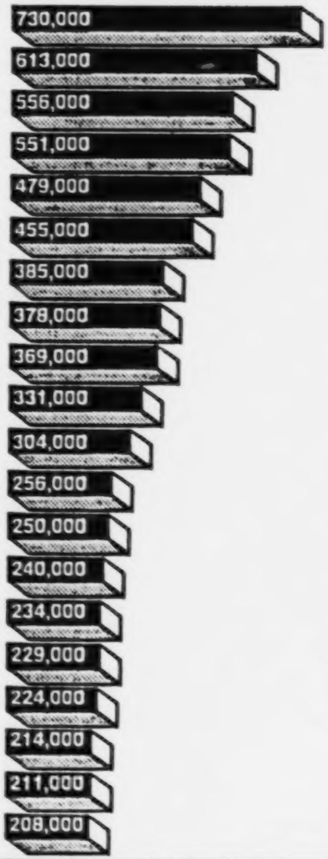
**Jobs requiring some career-related training or postsecondary education at the associate degree level. Registered Nurses can hold associate's or bachelor's degrees.*

GROWTH IN OCCUPATIONS, 1988-2000

One of the factors to be considered in making career choices is the long-range outlook for occupations. Every two years, the Bureau of Labor Statistics studies occupations and estimates their growth in the future. This chart shows the 20 occupations which will offer the most jobs and the 20 which are expected to grow at the fastest rate up to the year 2000.

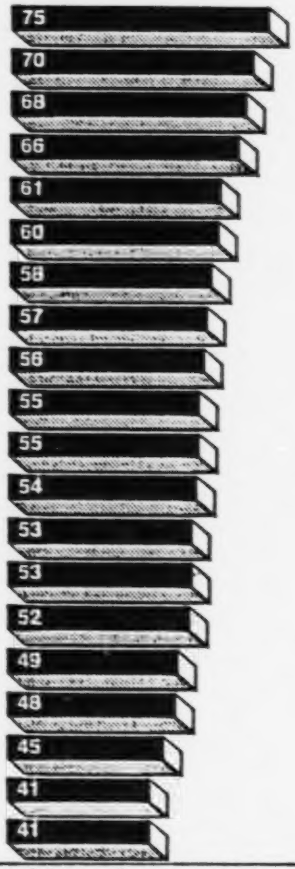
Careers should not be selected solely on the basis of long-range employment opportunities. But occupational outlook must be one of the factors considered in making career choices.

Numerical Change in Employment, 1988-2000



• Salesperson, retail	730,000
✓ Registered nurses	613,000
• Janitors and cleaners	556,000
• Waiters and waitresses	551,000
x General managers and top executives	479,000
✓ General office clerks	455,000
✓ Secretaries, except legal and medical	385,000
✓ Nursing Aides and orderlies	378,000
✓ Truckdrivers, light and heavy	369,000
• Receptionists and information clerks	331,000
• Cashiers	304,000
✓ Guards	256,000
✓ Computer programmers	250,000
• Food counter, foundation, and related workers	240,000
✓ Food preparation workers	234,000
✓ Licensed practical nurses	229,000
x Teachers, secondary school	224,000
x Computer systems analysts	214,000
x Accountants and auditors	211,000
x Teachers, kindergarten and elementary school	208,000

Percent Change in Employment, 1988-2000



✓ Paralegals	75
✓ Medical assistants	70
✓ Home health aides	68
✓ Radiologic technologoists and technicians	66
✓ Data processing equipment repairers	61
✓ Medical record technicians	60
✓ Medical secretaries	58
x Physical therapists	57
✓ Surgical technologists	56
x Operations research analysts	55
x Securities/financial services sales representatives	55
✓ Travel agents	54
x Computer systems analysts	53
✓ Physical and corrective therapy assistants	53
✓ Social welfare service aides	52
x Occupational therapists	49
✓ Computer programmers	48
✓ Human services workers	45
x Respiratory therapists	41
✓ Correction officers and jailers	41

✓ occupations requiring job-specific training or education at the two-year college level (45%)

• occupations requiring on-the-job training (30%)

x occupations requiring baccalaureate or higher level training (25%)

✓ occupations requiring job-specific training or education at the two-year college level (70%)

x occupations requiring baccalaureate or higher level training (30%)

Minichart prepared by the "Career Opportunities News", P.O. Box 190 Garrett Park, MD 20896 and based upon data in the "Occupational Outlook Quarterly", fall 1989. (Educational requirements prepared by PACE, P.O. Box 587, Pendleton, SC 29670.)

Note: Occupations such as registered nurse and computer programmer may require either an associate or bachelor's degree for entry.

(8/90)

America's Shame, America's Hope
Twelve Million Youth At Risk

This report is an inquiry into the education reform movement of the 1980's with at-risk youth as the frame of reference. The Charles Stewart Mott Foundation asked MDC, Inc., to bring together a distinguished panel, knowledgeable in the field of educating and training youth, and to launch a study of how at-risk youth had fared in the education reform movement which began roughly with the publication of the National Commission on Excellence in Education's report, A Nation At Risk, in 1983. This report was written by MDC staff R.C. Smith and Carol A. Lincoln with the advice and review of the panel whose names appear below.

Kenneth B. Clark, *Chairman*
Kenneth B. Clark and Associates, Inc

Jane Lee J. Eddy
Taconic Foundation

Vilma S. Martinez
Munger, Tolles and Olson, Los Angeles

Robert C. Penn
Annie E. Casey Foundation

Frank J. Slobig
Youth Service America

Franklin Williams
Phelps-Stokes Foundation

The following served as field research associates for the study: Judy Chynoweth, Wayne Daves, James Lott, Jerry Mabe, Robert McPherson, Anthony Redwood, Ray Reisler, Morton K. Sklar, and David M. Snedeker.

About the Panel and Authors

Kenneth B. Clark

Dr. Clark is a distinguished Professor of Psychology Emeritus of the City University of New York and President of Kenneth B. Clark and Associates, a professional consulting firm. He is the author of numerous articles and several books, including Prejudice and Your Child (1955), the prize winning Dark Ghetto (1965), and Pathos of Power (1975). His work on the effects of segregation on children was cited by the US Supreme Court in the historic decision of Brown vs. the Board of Education, 1954. Dr. Clark served for 20 years as a member of the Board of Regents of the State of New York.

Jane Lee J. Eddy

Ms. Eddy has been the Executive Director and Trustee of the Taconic Foundation, Inc. since 1958. She is President of Smokey House Project in Danby, Vermont and Chairman of the Youth Energy Corps in New York City. Ms. Eddy has lectured widely and testified before the US Congress on the use of worksite training for enabling young people to learn to work. She is a member of the Board of Rensselaerville Institute in Rensselaerville, New York and of the Board of the Graduate School of Political Management in New York City.

Vilma S. Martinez

Ms. Martinez is a Partner of Munger, Tolles, and Olson in Los Angeles and Chair of the Board of the Achievement Council, a nonprofit organization concerned with increasing the achievement levels of poor and minority youth. She is the former Chairman and current Member of the Board of Regents of the University of California and Vice Chairman of the Board of the Hazen Foundation. Ms. Martinez is the former President and General Counsel of the Mexican American Legal Defense and Educational Fund.

Robert C. Penn

Mr. Penn is a Senior Executive with The Annie E. Casey Foundation. Before joining the Foundation, he headed his own company, Universal Management Consulting Group, Inc. and served as the first President of New York Works, Inc., a private training and placement company for low-income individuals. Mr. Penn was Senior Vice President of the Manpower Demonstration Research Corporation (MDRC), a nationally recognized research and demonstration firm, and the first Commissioner of Human Resources for Buffalo, New York where he also headed two other municipal departments.

Frank J. Slobig

Mr. Slobig is Director of Youth Service America, a non-profit organization which serves as the national catalyst offering financial, technical, and promotional support for youth service programs. Mr. Slobig has worked in youth programs as a policymaker, analyst, and administrator for three decades. From 1982 to 1986, he directed the Roosevelt Centennial Youth Project and prior to that served as a US Department of Labor research and evaluation officer of youth programs. He was director of a multi-service neighborhood center for Milwaukee's Inner-City Development Project, assistant director of Chicago's Archdiocesan Office of Urban Affairs, and an associate pastor of two inner-city Chicago parishes during 1961 to 1971.

Franklin H. Williams

The Honorable Mr. Williams has been the President of the Phelps-Stokes Fund since 1970. Prior to that time, he was the Director of the Urban Center at College University and Ambassador to Ghana from 1965 to 1968. He is Chairman of the Boys Choir of Harlem and the Harlem Youth Development Foundation, President of the Bishop Tutu Southern African Refugee Scholarship Fund, and Chairman of the Judicial Commission on Minorities.

R. C. Smith

Mr. Smith is a Senior Research Associate with MDC, Inc. and an author, columnist, and teacher of journalism at the University of North Carolina in Chapel Hill.

Carol A. Lincoln

Ms. Lincoln is a Senior Research Associate with MDC, Inc. and a former staff member of the National Commission for Employment Policy and the New York State Manpower Resources Commission.

Many persons and agencies provided advice and assistance as we carried out this study. **We wish to extend special thanks to Robert Palaich, Kent McQuire, and Patty Flakus of the Education Commission of the States for the many times they helped direct us to resources and experts.** We also wish to thank the staffs of the governors, the chief state school officers, the state Job Training and Partnership Act agencies, and other state-level staff who were generous with their time and their information. Our thanks go as well to the following who helped during the early or final stages of the project:

Joseph W. Beard
National Association of Bilingual Education

Gordon Berlin
New York City Human Resources Agency

Jon R. Blyth and Judy Samelson
Charles Stewart Mott Foundation

Jack Brizius
Brizius and Foster

Cindy Brown
Council of Chief State School Officers

Everett Crawford
National Commission for Employment Policy

Jackie Danzberger
Institute for Educational Leadership

Jacqueline Dennis
The Council of The Great City Schools

Janice Earle
National Association of State Boards of Education

Evelyn Ganzglas
National Governors' Association

Vance Grant
US Department of Education

Bret Halverson
Bank Street College of Education

Genevieve K. Howe
Human Environment Center

Nate Jackson
Southern Education Foundation

Gary Lacey
Children's Defense Fund

Michael Landini
National Alliance for Business

Charles Law and Pierce Hammond
Southeastern Regional Council for Improvement

Milton Little
Manpower Demonstration Research Corporation

Michael E. Martinez
Educational Testing Service

Sandy Schifferes
US Department of Labor

Margaret Terry Orr
Structured Employment/Economic Development Corporation

Tom Owens
Northwest Regional Laboratory

Gary Walker
Public/Private Ventures

Lucy Watkins
Center for Law and Education

James M. Weber
Ohio State University

Foreword

Kenneth B. Clark
Chairman

The facts and the tragedy of millions of youth at risk throughout America are made disturbingly clear by this report. It cites previous studies, reports, conferences, and programs designed to reduce the extent of the risks. What is equally clear, however, is that in spite of these reports, discussions, and programs, the number of youth at risk throughout the nation has not decreased, but, rather, has increased.

The problems related to at-risk youth appear to be intractable; yet while solutions evade our grasp, society has little difficulty diagnosing the personal, educational, and related social profile of these youth. Reports define the problems in detail. It is generally agreed that a disproportionate number of at-risk youth come from the socially, racially, and economically disadvantaged groups in our society. They are seen as the human detritus of the ongoing cycle of family and group deprivation. The symptoms of this deprivation are constantly negative, but attempts to understand, control, and remedy the causes of the problem are tantalizingly evasive.

As we seek to understand and cure the fundamental underlying problems of youth at risk, we are confronted with the fact that society is not only reluctant to face, but, by its rejection, is responsible for perpetuating the problem. At-risk youth are consciously or unconsciously perceived and treated as if they were expendable. The revelation of their expendability begins in the early stages of their education where they are subjected to inferior schools and low standards of learning. Early in their lives they are programmed to be victims of the prophecy that they cannot benefit from the standards and quality which are provided for children from more privileged groups. This pattern of inferior education, of low standards and expectations, continues through secondary school and culminates in failures, dropouts, and pushouts. The victims become aware that they are ignored, rejected, and neglected, and that schools, which are the inescapable agents of society, are not preparing them to play an economically and socially constructive role. They are the unavoidable victims of the larger pattern of social, racial, and educational discrimination.

Educational literature has been replete with rationalizations for why at-risk youth cannot be taught and cannot be held to normal standards of achievement. Statements are made to the effect that the cultural deprivation of their families blocks the ability of these young people to learn, and therefore, they cannot be expected to benefit from effective teaching. Earlier explanations for the educational retardation of at-risk, rejected youth were that they were genetically inferior. More recent diagnoses are more sophisticated. Some educators now publicly state that these young people have quite different "learning styles" which interfere with their ability to be taught basic academic subjects. These remain the unstable educational foundations that perpetuate the cycle of youth at risk.

This mockery of democracy is not resolved by the occasional programs seeking to help a few of these students while ignoring the plight of the overwhelming majority of them. It is difficult to understand how a society which claims to be concerned with cost-effectiveness in its overall economy could, at the same time, continue to pay the high cost of producing increasing numbers of an unproductive underclass. An analysis of the ongoing problem of at-risk and demeaned youth reveals that this most precious of all resources, human beings, is being damaged and wasted. The bulk of the young people who are at risk are subjected to psychological genocide. They are robbed of self-esteem and the capacity to achieve. They are trivialized and relegated, at best, to ever decreasing job levels, and at worst, to correctional institutions whose per-capita cost is many times greater than the cost of effective education.

Instead of being encouraged to develop the qualities essential for a constructive role in a society, the whole pattern of their life experience is one of discouragement, despair, and internal and external self-destruction. It is a remarkable achievement when young people, born to these circumstances, can break out and assume productive lives. Yet the very presence of success stories shows that at-risk youth present not so much an intractable problem as a group whose potential society chooses to ignore. We can rescue at-risk youth for lives of opportunity if we have the will.

As one wrestles with this persistent cycle of human and social degradation, one is confronted with a fundamental proposition: The decisionmakers of our society and of our educational system do not identify or empathize with these rejected youth. We show them no respect nor the acceptance which is essential for them to develop as socialized human beings.

It appears that the very foundation of democracy is being corroded as our young people are consigned toward America's form of social concentration camps without walls. The plight of youth at risk will not be remedied until the social insensitivities of the larger society are faced and eliminated. A society which continues to erect excuses for abiding the educational inferiority of less privileged young people is perpetuating the pattern of at-risk youth and the fundamental risks of the society as a whole.

This report challenges each of us to turn America's shame into America's hope. All we need is the will to act.

Kenneth B. Clark

Kenneth B. Clark
July 12, 1988

A crisis exists in the back rows of America's public school classrooms. It has so far eluded the full attention of the much-bruited education reform movement of the 1980's. Yet its threat to our economic future, and to the lives of millions of American youth, is present, grave, and sure to become more costly to meet, the longer we delay in meeting it.

The crisis is the under-education of a body of students presently constituting one in three in our classrooms, growing each year as a proportion of our educable young. Dominant in this body are the children of poverty—economically, culturally, racially, and ethnicly disadvantaged. They have come to be called youth "at risk" because they are at risk of emerging from school unprepared for further education or the kind of work there is to do. Often they are ready only for lives of alienation and dependency.

They are said to be failing in school, and yet it is clear that it is we who are failing to educate them. The danger this failure of education poses to these youth and to all of us grows apace. It is best described first in terms of the realities of today's and tomorrow's job market and then in terms of the young Americans who will be expected to fill these jobs.

By 1990, barely two years from now, three out of four jobs will require educational or technical training beyond high school. Projections for the year 2000—12 years from now—are that new jobs will require a work force whose median level of education is 13.5 years. That means, on the average, that the workers who fill these jobs will have to have some college training. Not to be the boss, mind you, but just to bring home a paycheck. Looked at another way, jobs in which a large proportion of workers have less than four years of high school are among the slowest growing and poorest paying in the economy, being outpaced by jobs requiring higher levels of mathematics, language, and reasoning skills—smarter jobs, then, and far more of them. The private sector demand for employment is expected to reach 156.6 million by 1990, nearly twice that of 1978.

Who will fill these jobs? Everything points to a serious labor shortage whose shadow is already upon us. The number of young people available for work is declining. In 1978, young people 16-24 years of age were 23 percent of our total population. By 1995, they will be only 16 percent. This translates to a decline of about four million. Already, labor shortages have been reported and "help wanted" signs posted in store fronts; modern, retooled manufacturing plants; and service industries.

Fewer youth, more unfilled jobs—that is the prospect. And of these youth, an increasingly higher percentage will be minorities—by the year 2000, one out of every three Americans. The inescapable conclusion is that the youths who are at risk in school today and tomorrow will have to help fill those jobs if our economy is to continue to grow. Can they do it? If we had to answer that question as matters stand today, we would have to agree with the most experienced and thoughtful people who have looked at this problem: The answer is no, not a chance.

The children of poverty, who make up a disproportionate percentage of the at-risk population, can truly be described as educationally neglected. By virtually every standardized test administered to ninth graders and above, blacks and Hispanics score at 70 percent of white scores. The average black 17-year-old reads at the same level as the average white 13-year-old. As these disparities continue, we are in danger of creating the long-feared permanent underclass of unemployed and working poor at the same time we create whole new categories of jobs to go begging. We are on the way to creating a soup-kitchen labor force in a post-industrial economy.

The underclass has already begun to take form. The rate of dropping out of school has held steady at about 25 percent since the 1960's. Yet the real, mean earnings of 20- to 24-year-old male dropouts declined 41.6 percent (from $11,210 to $6,552) between 1973 and 1984. The decline for Hispanic young men for the same period was 38.6 percent. **The decline for young black males was 61.3 percent.** Interestingly, in the same period, black male college graduates were able to raise their income by 16.6 percent. It is not difficult to see why the gap between our wealthiest and poorest people is greater than at any time since these statistics were first kept in 1947. This depressing decline in earning capacity for undereducated minorities already is making its ugly mark on family life, breaking up homes, forestalling marriage. The truth is that many young Americans no longer can afford to get married. And for too many of our youth the easy money of the drug world offers more incentive than our education system. "If you are black, Hispanic, or Indian, and live in the inner cities of this nation," writes Richard Green, chancellor of the New York City school system, "there is about a 50-50 chance you will never have a long-term permanent career."

Minority youth make up the preponderance of this group of at-risk youth, but they are not the whole story. Studies have shown that the single common characteristic of at-risk youth is not race or economic disadvantage, but low scores on tests of basic skills—reading, writing, and computing. One-half of all the 1979 juniors who scored in the bottom fifth of the Armed Forces Qualification Test for 16- to 17-year-olds had not graduated by 1981, whereas only four percent of those in the top fifth had not graduated. The authors of the study that recently presented these figures, Gordon Berlin and Andrew Sum, observe: "If we want to reach the lowest-scoring dropouts who constitute the core of the dropout problem, we must address the syndrome that is the major cause of their leaving school: low achievement, falling behind modal grade, poor performance, and a sense that they cannot keep up with their peers."

Each year, nearly one million youth drop out of school. A million dropouts per year means that today, within our pre-school and school-age population, there are 12 million youngsters who will become dropouts by the year 2000. While a modest number—perhaps 2 million—may earn equivalency diplomas by the time they reach their 20s, the overwhelming odds are that at least as many of our high school graduates will be leaving school without the foundation necessary to obtain adequately paying and secure jobs.

We are not successfully reaching the majority of these youth. We are not successfully teaching basic skills or motivating youth to learn them. The implications for the youth are tragic as we have seen. The implications for the nation may be no less so. David T. Kearns, chairman and chief executive officer for Xerox, spoke for many American businessmen when he said: "The basic skills in our work force—particularly at the entry level—are simply not good enough for the United States to compete in a world economy."

This report is an inquiry into the education reform movement of the 1980's with at-risk youth as the frame of reference. The Charles Stewart Mott Foundation asked MDC, Inc., to bring together a distinguished panel, knowledgeable in the field of educating and training youth and to launch a study of how at-risk youth had fared in the educational reform movement which began roughly with the publication of the National Commission on Excellence in Education's report, A Nation At Risk in 1983. The Foundation asked MDC and the panel to look at the federal role in education reform during the 1980's and to concentrate its efforts on a survey of how the states, which assume primary responsibility for education, were performing. This report was written by MDC staff with the advice and review of the panel whose names appear inside the cover.

It is sometimes forgotten that in A Nation At Risk, the National Commission identified as a federal role focusing the national interest on education and helping fund and support efforts to protect and promote that interest. Since the enactment of the Elementary and Secondary Education Act in 1965, the federal role in elementary and secondary education has been closely identified with youth who meet the definition of "at risk"—socio-economically disadvantaged, English-deficient, and physically and mentally handicapped. More recently, students who are homeless, victims of abuse, substance abusers, and delinquents have been added to the list of youth drawing federal concern.

Yet, in the 1980's—the very years in which public recognition of the depth of the problem has begun to grow—the federal commitment to education has declined in real dollars by 23 percent. The federal share of the total education bill has declined from 8.95 percent in 1980 to 6.27 percent in 1987. Elsewhere in this report, we examine the ways in which that commitment has shrunk. At present, the federal commitment is sufficient only to serve:

One out of every five low-income children in need of pre-school education.
Two out of every five children in need of remediation.
One out of every four children in need of bilingual education.
One out of every 20 youths in need of job training.

What is tragic at this point beyond these dismal numbers is the lack of any policy toward at-risk youth. It is as though they did not exist, or as though we really did believe they are expendable, as Dr. Kenneth Clark suggests in the foreword to this study. Despite warnings from the private sector, from economists, from advocates—indeed despite repeated public warnings from inside the administration itself—there is no federal comprehension of the problem, no strategy for its solution.

State and local spending for public schools, on the other hand, has increased. State spending has increased 26 percent beyond inflation since 1980—from $46.5 billion to $80.4 billion. Local dollars have increased 29 percent—from $40 billion to $70.5 billion. The bulk of this money, however, has gone to improving teacher salaries and lengthening the school day or school year. One study found that 43 states had strengthened high school graduation requirements, 14 states had adopted some kind of "merit" pay, and 37 had attempted to lure the best candidates among college students into teaching through scholarships and other incentives. The researcher who produced these numbers noted: "Although standards have been made tougher, only a handful of states have appropriated additional moneys for counseling and remediation for those who will need assistance in reaching these standards." Nobody would question the wisdom of states seeking better teachers and motivating them to succeed, and most educators agree that standards in the classroom need to be higher. But enacting "instant" stricter standards without helping students already behind meet them can only be regarded as folly.

And that is exactly what we have been doing. Terrel H. Bell, former Secretary of Education and the man under whose administration A Nation At Risk was written, recently observed that the school reform movement is benefiting 70 percent of the students. "The other 30 percent are low-income, minority students and we are still not effectively educating them."

Our report confirms this finding. We estimate that only five percent of state education funds are being used specifically for service to at-risk youth. Furthermore, there is evidence in this report that some educational reforms actually are harming at-risk youth.

In late 1987 and early 1988, we surveyed each of the states to get a sense of where they were with regard to the broad spectrum of programs for at-risk youth. Based on the results of that survey, we placed the states on a four-phase continuum beginning with bare awareness of the problem and culminating with implementation of a state-wide program for at-risk youth. Figure 1 illustrates that continuum, which can be seen as the various stages, or phases, of development of services for at-risk youth.

When MDC surveyed the states' excellence in education commissions spawned by the A Nation At Risk report in 1985, we found what we thought was an appalling lack of awareness of at-risk youth in these bodies. Only 15 of the 54 commissions responding from 32 states had so much as one recommendation for educational reform aimed at a group that could be described as at risk. We were told, however, in telephone conversations with commission staff and members, and other educators, that the states themselves were farther ahead. However that may be, our survey now suggests that while all of the states have moved into the earliest phase of activity (Awareness), only 14—California, Connecticut, Florida, Illinois, Maryland, Massachusetts, Minnesota, New York, Oregon, Pennsylvania, Rhode Island, Texas, Washington and Wisconsin—can safely be said to have reached the second phase of Action. Another 11—Arkansas, Colorado, Delaware, Indiana, Kentucky, Maine, New Hampshire, New Jersey, North Carolina, Ohio, and South Carolina—are showing real progress toward the Action Phase. So, in effect, half of the states at this point—nearing the end of this decade of focus on and funding for excellence in education—are barely aware of the existence of a problem with at-risk youth. Based on these results and those of our examination of federal involvement in the schools, we present findings and recommendations in Figure 2.

Former Secretary of Education William J. Bennett in a recent report on the educational reform movement, handed out the grade of C+ to the schools but went on to say that the nation remains at risk. "The absolute level at which our improvements are taking place is unacceptably low," he wrote. "Too many students do not graduate from our high schools and too many of those who do graduate have been poorly educated . . . Good schools for the disadvantaged and minority children are too rare, and the dropout rate among black and Hispanic youth in many of our inner cities is perilously high."

A level of improvements "unacceptably low" and a dropout rate for minorities "perilously high" seems to us to describe what we have seen with regard to service for at-risk youth in the American public schools. We would agree that the nation remains deeply at risk. We would further submit that too many of our youth are already beyond risk. We could not give the states of this nation a passing grade for what has been done for youth at risk up to now. We would have to hand out an F. At the bottom of the states' report card, we might write: "Still failing but at least beginning to pay attention in class."

For the federal government's own recent stewardship of the problem we can think of no appropriate grade. "Absent" is the school term that comes most readily to mind.

One of the more frustrating aspects of our current dilemma is that if one looks closely at the states, and at the processes and programs in place, it becomes clear that in many places progress is being made, some of it dramatic. It also is clear that we know how to teach at-risk youth and that the means to this end turns out to work for all youth. In our report, you will meet a few young people who have experienced failure and are beginning to experience success. Sadly many others have come out of the school systems of our country with little more than vague and likely vain hopes. We also have a look at alternative school programs that work in one of the numerous American communities in which programs like these function.

If we know what to do for our at-risk youth—if we know how to educate American youth better—can we afford to do it? We are convinced that the most formidable barriers to assisting at-risk youth do not concern lack of money but failure to perceive them as in need of specific long-term attention, resistance to institutional change at the state and local levels, and an absence of genuine leadership at the federal level.

That is not to say that money is not an issue. Everything costs money and quality education is no exception. But unlike expenditures for the concrete to build roads or the armor for defense, expenditures for education carry a systematic array of expanding societal benefits from one generation to another, while the failure to spend carries penalties of a severe sort, penalties which we have been paying exorbitantly in recent years. They attach to the quality of life in America, social as well as economic. But, by themselves, the economic benefits of real school reform to all of us are worth a look.

The Hudson Institute notes: "If every child who reaches the age of seventeen between now and the year 2000 could read sophisticated materials, write clearly, speak articulately, and solve complex problems requiring algebra and statistics, the American economy could easily approach or exceed the 4 percent growth of the boom scenario. Unconstrained by shortages of competent, well-educated workers, American industry would be able to expand and develop as rapidly as world markets would allow. Boosted by the productivity of a well-qualified work force, U.S.-based companies would reassert historic American leadership in old and new industries and the American workers would enjoy the rising standards of living they enjoyed in the 1950's and 1960's."

Clearly, the national economic gains would be exponential. Each of us would share in the benefits of a healthy expanding economy. Seen this way, the investment in a better, quality education for all young Americans is probably the soundest one this nation could make. Against this order of benefits, the increased educational costs are beggared.

Even if we take the narrower view, focusing economically only on the young people themselves, the bright and dark sides of the coin for all of us show in sharp relief.

- The 973,000 dropouts from the nation's high schools in 1981 will lose $228 billion in personal earnings over their lifetime, while society will lose $68.4 billion in taxes.
- On the other hand, the Committee for Economic Development found that every $1 spent on early prevention and intervention can save $4.74 in costs of remedial education, welfare, and crime further down the road. If we could but raise the mean-tested skills of our nation's 19- to 23-year-olds by **one grade equivalent**—a goal that would be considered within reach for any computer-assisted remediation program in the country in fifty hours—lifetime earnings would increase by 3.6 percent, according to researchers Berlin and Sum, "and the likelihood of births out of wedlock, welfare dependency, and arrests would decline by 6.5 percent, 5.2 percent, and 6.2 percent respectively."

It is against this backdrop of cost, wasted money, cost, wasted people, and more cost, that we must look at a greater investment in our school system. The real question is what would it cost us to eliminate some or much of this unconscionable waste? Or, to put it another way, how much are we willing to pay now to avoid paying almost five times as much later?

The William T. Grant Foundation Commission on Work, Family, and Citizenship has recommended that the federal government invest in at-risk youth an additional $5 billion annually over the next 10 years to serve between three and four million additional youth each year. If this expenditure of $50 billion were to be invested, **it would still be less than society's loss of tax dollars from dropouts in a single school year over these youths' lifetime.**

We are talking common economic sense here, but we are also talking about equity. In the 1970's, when state budgets were fatter, a major consideration in education was equity—the need to assist the poorer school districts with the bigger burden of economically disadvantaged students. In the 1980's, the emphasis has been on excellence in education. But too often, it is as though we had forgotten equity considerations entirely. The bulk of the new money that has gone into educational reform has not been distributed through equalization formulas. Only a handful of states have adopted policies for targeting scarce at-risk-youth funds to districts with the greatest need.

An example of the pernicious nature of this failure of equity is the distribution of computers in our public schools today. While teacher tutoring, peer tutoring, and various other components including smaller class size must be in place for a successful remediation program, computer-assisted remediation has proved itself with at-risk adults and youth inside and outside the classroom. Yet a recent survey by the Educational Testing Service shows that only a small percentage of computers in schools are being used directly for teaching basic academic skills, and that these are preponderantly in the wealthier school districts rather than in the poorer ones where they are more needed.

The time has come for us to marry the equity considerations of the 1970's with the excellence in education concerns of the 1980's and begin educating in a way intended to reach every American youth instead of only those lucky, advantaged ones in the front rows.

Inequities on the order discussed here raise the question of whether our at-risk youth are considered expendable by the society into which they have been born. Every bit of evidence we have seen goes to the conclusion that most at-risk youth can learn and will learn, given patience, the proper opportunity, and the right tools. And, perhaps, great expectations from a skillful teacher. Jaime Escalante, whose high school students from a Los Angeles barrio have been routinely passing Advanced Placement calculus exams for several years now, is a fine teacher, but he is not alone. We have the teachers, we have the tools; do we have the will?

We have not shown that we do. The Reagan Administration set as a national goal a 90 percent graduation rate by 1990. In 1982, the national graduation rate was 69.7 percent. The national graduation rate for 1986 was 71.5 percent, a bare two percentage points higher than it had been four years before. And these were years in which the federal commitment to education declined.

Do we have the public will to make this possible? The time is propitious. In most polls, the public has demonstrated a willingness to support the cost of a quality education system. And in polls conducted over the last year, two out of three Americans said they wanted the federal government to be very involved in helping people get an affordable education.

In truth, we all bear a burden for action. As businesspersons and workers, as parents, as citizens, we all owe awareness and the willingness to act to solve the complex of problems put forth here. Acting for the future of our youth is not a spectator sport. While the burden of this report goes to what happens inside the schools, education is a community affair. Significant change will not occur until parents give willing educators their support, and until we as Americans—whatever our race, gender, or age—see our own future and our country's future in the eyes of all American children.

The states have taken a small step forward toward a future in which this nation ceases to treat a large portion of its youth as though they were expendable. Yet much remains to be done and time is short. We need a leap forward, a movement of saving grace for these young people of ours, a tender of this country's regard for its youth no less than for the survival of its economic leadership. The time is now. This opportunity will not come again, nor, perhaps, will another half as full of hope.

Figure 1.
Policy and Program Development Phase-Descriptor Continuum

Pre-Awareness

- General lack of public discussion. Awareness only of a "dropout problem," but not any specific group at high risk of becoming dropouts. Concerns center on one or more sub-groups, such as "teen-age parents."
- School reform measures aimed at college-bound students. At this stage, problems of students described in terms of "truancy" or other terms implying the student is at fault.
- Schools operate with non-collaborative attitudes toward other community agencies. No attempt to involve those parents or social agencies in the community concerned with youth in school, such as drug counseling agencies and JTPA.
- Overriding philosophy that all children start at the same place in their education and need only have the lessons presented to them, with individual failure to learn attributed largely to lack of effort.
- No policy or legislation dealing with at-risk youth as a special group in need of long-term, special attention. Some programs exist, but no state effort to coordinate them or even to recognize them as applicable to a generic group of students.

PHASE I. Awareness

- General discussion occurring among political and educational leaders with some carryover to the general public. The term "at-risk youth" used popularly.
- School reform still focuses generally on successful students. Some awareness that special attention must be paid to a group of students who are not succeeding and are at risk. Dropout prevention becomes a goal.
- Some awareness of the need for collaboration between schools and other community agencies, frequently expressed in the formation of task forces to study the problems of at-risk youth or to coordinate efforts to assist them.
- Softening of the attitude that all children begin their education with the same advantages. Some concomitant efforts here and there to affect early childhood differentials with pre-kindergarten or kindergarten enrichment programs for poor youth.
- Scattered statements of policy, from the governor's office, the office of the chief educational officer, or one or more of the task forces. Generally these call for attention to the problems of at-risk youth but typically are not enforceable and do not constitute "state policy" as such.
- Scattered legislation, usually directed at sub-groups of at-risk youth such as teen-age parents, offenders, drug abusers or others that are of special interest to certain state agencies or officials. Legislated allocations vary from none (simple empowerment of the localities to fund programs) to modest. No comprehensive legislative acts.
- Some increase in program initiatives, often involving national or state demonstrations, and a marked increase in local programming for at-risk youth.
- Preliminary efforts to quantify the problem and some census-taking to determine the extent of programmatic effort.

PHASE II. Action

- Full-scale discussion by the state political and educational leadership and broad public discussion as well. May be accompanied by the beginning of a public relations campaign designed to make citizens aware of the implications of the at-risk problem for the economy of the state.

- Better understanding of the proper configuration of true school reform. Awareness that tightening academic requirements must go hand in hand with remediation for those students not succeeding under the old requirements.
- Serious efforts at collaboration, such as involving parents in the educational effort of their children, use of private sector mentoring, and joint programming utilizing federal (JTPA, Chapter I, Vocational Education, etc.) funds along with state and/or local money.
- Recognition that a considerable number of youth in public schools are, for one reason or another, at risk of failure to graduate or of emerging from school unprepared for a working career, and that this problem is associated with poverty although not limited to the children of the poor.
- Serious progress in state policy-setting, involving inevitably, the office of the governor. Leadership statements of a policy nature, although not necessarily constituting enforceable, state-wide policy.
- Significant, although not comprehensive, state-wide legislation likely to be labeled for "at-risk youth"—although sub-groups may continue to be targeted—and to involve major state funding.
- Widespread state and local programming for at-risk youth, often involving school-to-work and usually involving remediation in the middle school grades and even pre-school.
- Beginning awareness of the need for restructuring in both the elementary and secondary grades, by which is meant some fundamental rethinking of the delivery of education, usually involving some individual teaching (including computer-assisted education) and sometimes involving experiments with basic changes in the way the schools are run.
- Beginning awareness of the need to consider additional reforms in the distribution of state funds to assure that funds for poorer districts actually serve at-risk youth specifically.

PHASE III. Consolidation

- Full awareness by educational and political leadership of the economic, social, and human costs at-risk youth represent. Full public discussion.
- Development and emplacement of comprehensive, state-wide policy to assist at-risk youth, which includes clear goals and strong mechanisms to enforce program accountability.
- Passage of comprehensive legislation for at-risk youth, along with sufficient funding to make it possible to put policy and planning into effect beyond pilot communities.
- Broad range of program initiatives reaching all sub-groups of at-risk youth and falling within the range of policy planning done for the state.
- Full consideration of the issue of restructuring and equalization, and determination of the degree to which these reform measures should be enacted in the state.
- Deep involvement of the schools with parents and with other social agencies in the community.

PHASE IV. Implementation

- Implementation of all legislation, policymaking, and planning for at-risk youth.
- Implementation of restructuring and equalization measures.
- Full collaboration between schools and parents and social agencies in the community.

Figure 2.
Findings

- Awareness that the problems of at-risk youth cannot be solved solely by measures designed to assist advantaged youth has grown among the educational and political leadership of the states.
- Discrete, scattered initiatives on behalf of at-risk youth can be found in all of the states, but often they are funded on a pilot basis without guarantees that success will result in funding for either continuation or replication.
- Although data exist on various sub-categories of at-risk youth, differences in collecting style make it impossible to add the numbers to arrive at an estimate of the size of the at-risk population in each state.
- While 45 states report having legislation bearing on the problems of one or more sub-groups of the at-risk population, most of it is piecemeal in nature, typically supporting a limited number of pilot programs. Funding for programs specifically targeted to at-risk youth rarely exceed 5 percent of state education expenditures or affect more than 10 percent of the at-risk population.
- While policy statements from commissions, task forces, governors' offices, or state education departments can be found in 23 states in either draft or final form, no single state has an over-arching policy addressed to at-risk, school-age youth.
- Lack of public concern for the problems of at-risk youth stands as a barrier to building comprehensive approaches to serving them.
- The potential to serve at-risk youth through the federally funded Job Training Partnership Act—the nation's current national effort at job training and employment—has not been fully realized in the majority of the states. Nevertheless, national funding for JTPA is insufficient to reach more than a small percentage of at-risk youth.
- In many states, information about programs for at-risk youth is not shared well at the state level or between the state and local levels.
- Although state funding for education has increased since 1980, resources continue to be used disproportionately for students who begin their education better off.
- The at-risk problem is both an urban and rural problem. In the cities, funding cutbacks have worsened a grim situation and in rural areas of the South, Southwest, and West, little is in place to serve at-risk youth.
- Little real evaluation or monitoring is being undertaken on programs for at-risk youth outside the limited scope of nationally sponsored demonstrations. In consequence, while many interesting-sounding programs exist, little information is available upon which to base judgments of effectiveness.
- Evidence mounts that certain features of the excellence-in-education movement are contributing to the dropout problem.
- The educational excellence reform movement has largely overlooked the need to modify instructional techniques for at-risk youth.

Recommendations

- That Congress and the President restore the federal partnership in education by increasing the federal funding commitment to at least 10 percent of all expenditures for pre-school, elementary, and secondary education (at current levels, this would translate to an increase in federal expenditures from approximately $10 billion to nearly $18 billion) and that the additional funds be earmarked for programs and services directly affecting at-risk youth.
- That Congress pass legislation charging the Department of Education with responsibility and authority for coordinating and managing the federal government's response to the at-risk problem, including the development of a common definition of "at-risk youth" to be used in designing and targeting future programs. This legislation should establish a data base for purposes of documentation, monitoring, and evaluation, and Congress should provide sufficient funds to enable the Department of Education to promote widespread replication of successful program strategies for at-risk youth.
- That the Department of Education undertake an analysis of the unintended and negative consequences for at-risk youth of current education reform and existing job training and vocational programs, and report the results and recommendations for change to Congress by September, 1989.
- That the White House lead a national crusade to make sure that the equity considerations of the 1970's are joined with the excellence in education concerns of the 1980's in a campaign to raise the educational attainment level in our public schools for all of our children.
- That every governor who has not already done so establish a special standing commission on at-risk youth to investigate the nature of the problem in the state, examine the unintended consequences for at-risk youth of current state education reform and job-training policy, and recommend a concerted program of action that includes clear and progressively challenging goals for addressing the problem similar to the continuum of effort described in this report. The membership of the commission should include representatives from all state agencies serving at-risk youth, business and industry, local schools, parents' groups, community-based organizations, and the public. Governors in states where such a commission or task force is already in place should review membership to assure representation of each of these groups.
- That governors vest responsibility in and provide resources to a single cabinet-level agency or arm of state government to implement and coordinate the recommendations produced by the standing commissions.
- That as part of its work, each state commission/responsible agency undertake a campaign to make the public aware of the needs of at-risk youth and the danger this failure of education poses to the state's and the nation's future.
- That this campaign also include a program to educate schools, Private Industry Councils, and community organizations about federal, state, and local programs and practices already in place for at-risk youth and about models of cooperative intervention.
- That each state legislature pass comprehensive legislation establishing state policy for meeting the educational needs of at-risk youth and for increasing the graduation rate each year until it reaches 90 percent. Until the graduation rate equals or exceeds this 90 percent, 60 percent of each new state dollar earmarked for education should be spent for instruction and services for at-risk youth and the localities should match this level of effort wherever possible.
- That the governor and legislature of each state develop measures that will assure equity between richer and poorer school districts in the distribution of funds targeted for educational reform.
- That the commissioner or superintendent of education of each state develop recommendations for the state board and the legislature on ways to facilitate the restructuring of the schools to better meet the needs of at-risk youth, and that the legislatures provide incentives to local districts to carry out restructuring measures that will benefit the neediest students in the district.

MDC, Inc.

Founded in 1967, MDC, Inc. is a private non-profit research and demonstration organization concerned with strengthening the workforce and the economy through innovations in employment and economic development policy and programs. In 1985, the Charles Stewart Mott Foundation funded MDC's study, Who's Looking Out For At-Risk Youth, which reported on the level of attention paid to at-risk youth by the nation's educational excellence commissions.

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Attempts to integrate vocational and academic education — through academies, occupationally focused schools, and occupational clusters, for example — take seriously the vocational purpose of high schools and may remedy some chronic problems.

W. Norton Grubb

If you ask students why they attend high school, many will admit that they are there so they can get jobs. For middle class kids, high school is a necessary step before attending college so that they, too, can get jobs. The high school is an inescapably vocational institution, and, yet, the occupational focus is largely hidden.

Most adolescents seem not to understand how their schooling decisions affect their future careers. As the differences in earnings among high school dropouts, graduates, and those who pursue higher education have increased, so have the consequences of decisions about how far to go in school. Other choices during high school — whether to take math and science, whether to take college prep subjects or the general track, whether to work for good grades — open and foreclose occupational options, often irreversibly.

Since career counseling has all but vanished from most high schools, often no one advises students about the effects of their decisions. They don't understand how the content of their classes is related to what employers will ask of them, and most academic teachers don't do a good job of explaining. When we also consider that enrollments in traditional vocational education are dwindling, and graduation requirements are increasingly emphasizing the academic side, it's clear that high schools are not preparing many youth for specific occupations.

These developments have opened up a paradox: even as the high school has become increasingly crucial to occupational futures, most students regard it as an "academic" exercise. Fortunately, there are ways to restore the high school's occupational relevance and simultaneously address its most serious failings. Several of these reforms reverse the century-old division between academic and vocational education. There are, in fact, many different approaches to integrating academic and vocational education, supported by business people decrying "narrow vocationalism" within the schools, by vocational educators seeking new relevance for their programs, and by critics of academic education. Last but not least, in the recent amendments to the Carl Perkins Act providing federal funding for vocational education, Congress required that all funds be spent in programs that "integrate academic and vocational education . . . so that students achieve both academic and occupational competencies."

Here I'll look at three approaches that attempt to reshape both the academic and the vocational components of the high school. In many ways, the approaches are similar: they differ primarily in terms of scale. In the visits of my colleagues and me to schools around the country, we've seen examples of all of them, and I believe they have the potential for reconstructing the American high school (Grubb et al., 1991).

Academies

Academies — the first approach — usually operate as schools-within-schools. Because their scale is relatively small, academies have less of the chaos and anonymity of large high schools. They exist in many occupational areas, including electronics, computers, health, business, finance, media, teaching, and automotive trades.

Typically, four teachers collaborate: one in math, one in English, one in science, and one in the vocational subject that is the core of the academy. Each class of students takes all four subjects from these teachers, staying with them for two or three years. Other subjects — social studies, history, foreign languages, and other electives — are taken in the "regular" high school.

Some advantages of this format are that students have sustained contact with their teachers, who in turn come to know their students' individual problems and strengths much better than other high school teachers can. The academy structure also provides substantial opportunity for horizontal alignment of academic and vocational courses, as teachers coordinate the topics they teach, and vertical alignment, since teachers stay with a group of students for two or three years and can adjust the sequence of topics over time. Because teachers work in groups, academies also facilitate collective responsibility for student achievement, something usually missing in the traditional high school.

Another element of the model is a close relationship with businesses operating in the core occupational area. For instance, the electronics and computer academies located in Silicon Valley have initiated ties with high-tech firms, a health academy is located near a confluence of hospitals, and a technology academy has established good relationships with aerospace firms. American Express has established a series of Finance Academies. The firms provide mentors to students, send individuals to talk about their operations, give tours of their facilities, and offer summer internships. In these ways, they generate sources of instruction and motivation (cognitive, behavioral, and financial) beyond that provided by teachers. Further, by providing a context for instruction, the contact with businesses makes education at the academies real in a way that schoolwork at conventional high schools is not.

Another advantage is that each academy's clear focus — the occupational area that gives each academy its character — serves as a theme for integrating different subjects. Finally, evaluations of academies in California indicate that they reduce dropout rates and increase enrollments in post-secondary education among students who would otherwise be at risk of dropping out (Stern et al. 1989).

Occupationally Focused Schools

Occupational high schools and some magnet schools are excellent examples of "focus schools," another way to integrate academic and vocational education. Focus schools have clear missions, are organized to pursue their educational goals and solve their own problems, and operate with clear social contracts that establish responsibilities for teachers, students, and parents (Hill et al. 1990).

In some cities, occupational high schools emphasize preparation for clusters of related occupations. These include New York City's Aviation High School, High School of Fashion Industries, and Murry Bergtraum High School for Business Careers; the Chicago High School for Agricultural Sciences (all described in Mitchell et al. 1989); and the High School for Health Professions in Houston. In several ways, such schools are similar to the academy model, except that their scope is schoolwide.

The high school is an inescapably vocational institution, and, yet, the occupational focus is largely hidden.

Since all students at a focus school are preparing for a broad occupational area, academic teachers can emphasize the particular applications of academic instruction, and, together with vocational teachers, they can develop appropriate activities. For example, at an agriculture high school, a large chart in the teachers' lounge lists what each teacher is covering in each unit and when, so that teachers can readily discover possibilities for collaboration. The curriculum also includes courses in agribusiness, agricultural communications, food science (with a good deal of chemistry), applied biology, and other hybrids. The school is quite project-centered, providing another way for teachers to come together; some projects are included in conven-

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What Teachers Can Learn from Industry Internships

ANN M. FARRELL

As our industries struggle to remain competitive in a world market and educators struggle to prepare our students for careers that may not even exist yet, it is becoming apparent to executives and teachers that education and industry must work together. The problems we face in both domains require cooperation from all.

One way teachers and industry personnel can work together for our future is through summer industry internships for teachers. Recently, the Dayton-Montgomery County Public Education Fund Mathematics Collaborative in Ohio sponsored 18 educators in a summer industry internship program. One of the nation's 15 Urban Mathematics Collaboratives, the Dayton-Montgomery group is composed of school and university mathematics educators, administrators, executives, engineers, and scientists. Its goal is to improve mathematics education in our county. The summer internship program was one of the first projects developed to meet that goal. We learned a great deal from this project, much of which has implications for all areas of the curriculum, not just mathematics and science.

During the summer of '91, eight high school math teachers, four high school science teachers, two junior high math teachers, two 6th grade math teachers, an elementary school principal, and an elementary school computer specialist spent several weeks working in local industries with engineers, materials scientists, marketing analysts, environmental consultants, physicists, and other industry personnel. As they became part of company teams working on projects, the teachers looked for mathematics and science applications they could take back to their classrooms.

Peggy O'Brien found exciting mathematics and science applications for her classroom through her internship at General Motors.

All of the participants found these applications, but even more exciting (and unexpected) was the value they discovered in adapting their teaching methods to include more cooperative learning, open-ended problem solving, writing, and technology in order to better prepare students for careers in business and industry.

Learning to Work With People

Many teachers wrote at the conclusion of their summer internships about the non-scientific knowledge and skills that persons who work in industry need. Sixteen of our eighteen teachers mentioned that since working in teams is important in industry, they would incorporate more teamwork into their classroom methods. One teacher wrote:

> Most impressive to me for my non-college bound students was the set-up of teams. . . . The people on these teams knew everything about every job from the computers used on the assembly line to the quality control in the loading dock. They also had been trained in how to work as a team with all other members in their group.

Three teachers mentioned the importance of "networking" or "collaborating" skills. Three other teachers mentioned the importance of "people skills" and noted that cooperative rather than competitive teaching methods could help make these skills more a part of classroom learning.

Fourteen teachers described the importance of communication skills for the workers they observed and assisted in engineering or science laboratories.The teachers found this especially interesting because, before their schools' recent efforts to incorporate more writing across the curriculum, many of their students believed they could get by with strong science skills and weak language skills. The teachers now have proof that this isn't at all the case: scientists read reports and gather pertinent information from them, communicate work to peers in both a written and verbal format, work independently to research an issue and summarize findings, present reports, listen, and gather information in a variety of ways.

Applying Knowledge to Work

Seven teachers mentioned the importance of having students solve open-ended problems that do not have a "set answer or solution." Others said they would now adapt their lessons to be sure students had experience using such problem-solving techniques as determining how to structure a problem, solving non-routine problems, and finding the "best" solution rather than "the" solution. Some also mentioned that certain behaviors they had observed in industry personnel should become part of students' repertoires. These behaviors included planning solution strategies, discussing options before a decision is made, and designing tests and experiments.

Most of our teachers spent their first week on the job learning to use the computers and applications software necessary to work on their projects. Consequently, over half mentioned the need to integrate more technology (computers and calculators) into their school science and mathematics curriculums. And since they observed that "everyone in industry uses computers," they feel that technology should be integrated across the curriculum, not limited to advanced math and science classes.

Teachers wrote many anecdotes about important employee attitudes and traits that could be addressed in the classroom. These include the ability to overcome frustration or confusion, a willingness to experiment and try new things, a positive attitude or excitement about work, a positive attitude about science, being self-directed, having confidence, remaining calm when problems arise, and keeping a professional attitude when doing a group presentation. By giving examples of how these qualities are important in industry, teachers can reinforce their efforts to instill them in students.

Preparing Teachers for Internships

The lessons that can be learned from industry internships have implications for teacher preparation programs as well. One of our mentors, who teaches a computer applications course in a local community's adult education program, has offered to design a technology course for teachers. Future participants would be able to take word processing, spreadsheets, and database applications before they begin their summer internships. Not only will they be able to use these skills during their internships, but they can use them for developing course materials and keeping records at school.

One teacher's praise for his industry mentor shows how some simple mentoring activities would help schools to form a more collegial environment and help to keep first- and second-year teachers from abandoning the profession:

> The mentor is the most significant ingredient in making the experience a success and I was fortunate to have someone who believed in the importance of this program. . . . He met with me as soon as I arrived and spent about an hour acquainting me with some of the routines. He gave me a list of all the people's names with whom I might be working and their roles. I was given a desk in an office, a telephone, access to computers and a copying machine. My success was obviously a high priority for him.

Perhaps the experience of one first-year teacher summarizes what teachers can learn about methods, content, and professionalism from an industry internship:

> I found myself learning the ideas and concepts more quickly when I was able to actively participate. Students are the same — they need to be able to experience math instead of sitting at a desk using a pencil and paper.

Many current reports tell us that teamwork, problem solving, technology, and communication skills are necessary for success in industry, business or the scientific fields. After their summer internships, these teachers really believe in using teamwork and technology and integrating problem solving and communication into their courses because they have seen and experienced the need for these skills firsthand. They have also widened their circle of colleagues by working with fellow teachers and local industry representatives — professionals with whom they can exchange ideas about teaching, about mathematics, about science, and about careers in industry. ☐

Author's note: I am indebted to all of the teachers in Project GEMMA, among them Peggy O'Brien and Vickki Roseberry, both of Mad River Middle School/Delco Chassis Division of General Motors Corp.; and Tim Voegeli, Kettering Fairmont High School/Wright Patterson Air Force Base Materials Directorate, who were quoted in this article. Other Dayton area industries that have hosted and mentored teachers include Bank One, Dayton, NA; Eastman Kodak Company; EG&G Mound Applied Technologies; Harrison Division of General Motors Corporation; Mead Corporation; QSource Engineering Inc.; The Analytic Sciences Corporation (TASC); and Woolpert Consultants.

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tional courses, while others are carried out through extracurricular activities.

Similarly, in a health-professions high school, the teachers incorporate health-related applications in every class. All students take seven health science courses, which are more occupationally oriented (for example, medical laboratory techniques and patient care) than conventional biology courses. In occupational high schools, integration seems natural because of the goals of the school and the ambitions of the students. For example, a social studies and an English teacher might assign reports on the history of medicine, with the math teacher checking calculations and statistics.

The magnet schools that have opened as mechanisms of racial desegregation are similar to occupational high schools. Many have a focus on electronics, computers, or business, for example. Every student is enrolled in a curriculum incorporating courses related to the magnet's focus, so that all teachers can emphasize applications in that occupational area. Unfortunately, many magnets have not yet realized their potential to develop cooperation among teachers. In some, the vocational component is trivial, and others have been labeled magnets without making any concrete changes. Still other magnets are so preoccupied with racial desegregation that they have neglected curricular issues. Nevertheless, magnet schools have substantial promise as a way of reforming high schools by maintaining an explicit occupational focus.

Occupational Clusters

Occupational high schools and magnets generally emphasize preparation for clusters of related occupations, rather than the highly specific occupations of traditional vocational education. There are several other ways to incorporate occupational clusters into the high school.

A few schools have replaced conventional departments with departments organized along occupational lines. For example, Dauphin County Technical School, near Harrisburg, Pennsylvania (described in Adelman 1989), organized faculty and students into four occupational clusters: communications and transportation; construction, including the building trades; a service cluster encompassing cosmetology, health, distributive education, horticulture, and food service; and a technical cluster including chemical technology, electronics, data processing, and drafting. Each student takes vocational courses within each cluster, in addition to the academic courses required for graduation. Teachers are assigned to clusters; the academic instructors then teach students from specific clusters — for example, 10th grade English to students in the service cluster — giving them greater opportunities to orient their teaching to applications within that broad occupation.

The school has also integrated specific academic subjects with vocational coursework. For example, the English sequence emphasizes communications skills necessary for the workplace; math courses incorporate technical math; the science sequence includes Principles of Technology, an applied physics course, as well as more conventional courses; the social studies curriculum stresses the historical influences of work and technological advances, as well as employability skills.

In a different approach to occupational clusters, a few schools have retained conventional departments with occupational clusters cutting across departments. In one school, each student elects one of six "career paths" at the beginning of 10th grade. Career paths include required academic courses as well as a coherent sequence of broadly vocational courses. Extracurricular events might include visitors from industry, tours of firms, visits to postsecondary institutions with related programs of study, work experience programs, mentors, and summer internships (as in the academy model). Activities like these provide information about occupations and motivation from those outside the high school.

Teachers also belong to career paths as well as disciplinary departments, and meet regularly in career path groups to discuss possible activities and courses. By providing teachers natural connections to other academic and vocational teachers and a focus on a broad occupational area, career paths facilitate cooperation across courses and the incorporation of vocationally relevant material in academic courses.

In a variant of this approach, students elect "majors" during their junior and senior years, organized around broad occupational clusters. Like career paths, majors include related academic and vocational courses. In one school that has adopted occupational majors, English teachers and occupational instructors have collaborated in developing technical writing modules. More generally, the fact that all students have elected a major provides academic instructors with an obvious way to contextualize their instruction and clarify its relevance.

Both of these schools have taken special pains to prepare students to make rational choices of occupational clusters. In the school with career paths, the counseling staff was expanded and freed from disciplinary and personal counseling; a 10th grade research and writing project combining

English teachers, librarians, and counselors prepares students to elect their career paths. In the school offering majors, students take a series of nine-week modules in each of the occupational clusters during 9th and 10th grades, in addition to conventional guidance and counseling activities, to prepare them to select a major.

Schools with occupational clusters have much in common with the first two approaches. These schools look like academies or schools-within-a-school. And, as in a single-occupation high school, each cluster has its own focus and can develop its own culture. The differences are that *every* student is in one occupational cluster or another, and students can choose among clusters *within* a school, rather than choosing *among* schools, as might happen within a district with numerous magnet schools.

Powerful Consequences

The three approaches to restructuring the high school can be interpreted as ways of reforming vocational education, but their greatest promise lies in redressing some of the most persistent failures of the high school:

- *Eliminating the "shopping mall high school."* In place of the tendency for students to mill around and accumulate unrelated courses (Powell et al. 1985), these approaches provide a focus and coherence in the curriculum.
- *Improving the teaching of all subjects.* In schools that have integrated academic and vocational content, teaching has begun to change as academic teachers absorb instructional methods that have been more common in vocational classes — a greater reliance on project-driven approaches, on student-directed activities and student participation rather than teacher-dominated classrooms, on cooperative learning, on learning in the specific context, and on generic skills (Stasz et al. 1990).
- *Enhancing the engagement of students.* In many schools we've visited, the most attentive students have been in programs integrating academic and vocational education. In part, the student-centered and activity-based methods of teaching help hold students' attention. In addition, the effort to clarify the relationship between future occupations and present schoolwork promises to enhance students' motivation, as they come to understand how high school affects their future options.
- *Reducing the isolation of teachers.* Within academies, focus schools, and occupational clusters, teachers from different disciplines have reasons to meet regularly around curriculum, providing opportunities for collaboration and for the alignment of academic and vocational courses.
- *Reducing tracking and segregation of students.* As long as occupational clusters are broadly defined, they bring together students from very different backgrounds and with varied ambitions. The extracurricular activities — field trips, talks from business representatives, internships — provide opportunities outside the usual course structure for mixing students. For example, the health area might include both would-be doctors and practical nurses; an industrial technologies career path might include both future engineers, welders, and auto mechanics.
- *Preserving options for all students.* The schools discussed here have all adopted a broader conception of occupational preparation than traditional vocational education. Rather than preparing students only for entry-level employment immediately after high school, they also prepare students for postsecondary education or for the increasingly common combination of further schooling and work. Many of them have established 2+2 (2 years of high school combined with 2 years of school after high school) or tech prep programs to link their clusters with related postsecondary offerings.
- *Improving guidance and counseling.* Schools that have adopted an occupational focus have all improved their career guidance and counseling. Some have hired more counselors, but they have also experimented with novel approaches, including introductory modules and student projects related to career alternatives. Where students have to choose among occupational clusters or schools, they must confront early in their high school careers the options they face and the relationship between schooling and employment.
- *Providing a vision for business participation.* Academies, occupationally focused high schools, and occupational clusters all provide natural rationales for systematic contact with firms. In addition to providing extrinsic rewards like summer jobs and future employment, business can play an important role in motivation through testimony — testimony that most teachers cannot provide — that what young people learn in school is useful in other settings.

Reforming the High School

Creating an occupational focus for high schools is not necessarily an end in itself. Instead, it provides a vision of education and a way of overcoming some deficiencies of the high school, including those that developed from the original division between academic and vocational subjects and between college-bound students and those bound for work. Some crucial elements of these three approaches don't have much to do with integrating

Mending the Rift Between Academic and Vocational Education

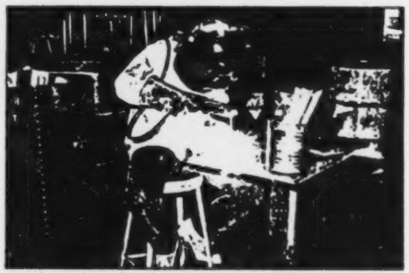
ANN M. DOUGLAS

Both "academic" and "vocational" teachers play an important part in the education of today's youth. Unfortunately, they often see their roles not only as different but competitive as well. This attitude is frequently manifested in a rift between academic and vocational education, which serves only to harm the students.

Some academic educators contend that vocational education should assume its extraneous role as the stepchild of the curriculum, offering blue-collar occupational skills training for students who cannot or will not be successful in the "academic" program. Others see it as a medium for students who want to "work with their hands," a phrase overused and misused by even the most well-meaning advocate. Many teachers and counselors also steer "academically talented" students away from vocational courses, further contributing to negative attitudes about such courses.

In addition, the few publicized unfortunate instances of the misuse of funds, toleration of mediocrity from students, and poorly structured, supervised, and taught vocational courses have not endeared vocational education to academic teachers. However, academic courses have not always found favor with vocational teachers either. Many, in fact, view the theoretical aspects of many academic courses as pompous and irrelevant. The prestige and attention bestowed upon them by school administrators and the public have widened the gap.

The rift between academic and vocational education has been especially magnified by the physical isolation of vocational facilities. Such isolation promotes psychological segregation of the two, further damaging the image of vocational education.



Ohio Department of Education

Students benefit when academic and vocational teachers become partners in their education.

Just what is it that separates educators into separate camps and stirs such academic bigotry against vocational education? It may well be that vocational educators and administrators are not blameless. Perhaps they have been too busy clamoring for a separate and special place in the curriculum. In their zest to accumulate numbers and provide a service for students, vocational educators may have too often allowed their programs to be used as dumping grounds for academically weak, disruptive, and habitually absent students. Maybe they have also been too humble about seeking respect for their students and their professions.

Whatever the reason, it's time for vocational educators to abandon their apologetic soapboxes and tackle the task of helping parents, students, and other educators realize that today almost all education *is* vocational — yes, even and especially, high-level mathematics and science. Further, to help mend the rift, vocational and academic teachers need opportunities to reflect on and discuss the objectives of their programs in relation to one another. How beneficial it would be if vocational and academic teachers could work together to help all students. Achieving a relationship of cooperation would require not only attention to attitudes toward vocational and academic education by both groups but efforts toward collegiality of education in general.

A good first step might be the deliberate dissolution of the separation of education into "academic" and "vocational" camps. Participating in one should not preclude involvement in the other; placing importance on one should not relegate the other to an inferior status. Rather, traditional academic and vocational education offerings should be complementary, thereby allowing the educational system to offer students the best well-rounded education possible.

A logical, though not an easy, approach would be to restructure the curriculum to integrate vocational courses into the core required course offerings. A true reformation of curriculum would call for a required number of units of vocational study, allowing students to select from an offering that meets their career objectives. The new required units would come from a wide range of offerings matched to grade level and course level of mathematics, science, and English courses.

Another action would be to retain, as practicable, vocational students at their school campuses in as nonrestrictive an educational environment as possible. Team teaching by academic and vocational teachers is also a possibility. Through such a partnership, teachers would not only complement each other's efforts but also have an opportunity to develop a rapport and an appreciation of one another's efforts in relation to the overall educational process.

Teachers must assume a shared responsibility for educating *all* students, for selling the virtues of academic *and* vocational elements alike, and for helping students, parents, and the community understand the importance and interrelationship of the two. Only then can all students be offered a true education that will prepare them for the world beyond high school, whether it involves full-time employment immediately after high school or more specialized education.

Educators must not lose sight of the fact that students would be the recipients of the benefits of such an integration of academic and vocational education. If students are to receive the quality education to which they are entitled, educators must stop seeing themselves as either competitive academic or vocational teachers but, rather, as coequal, collegial champions of all students!

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academic and vocational education. Coherent programs of courses, improved counseling, the smaller scale and continuous contact between teachers and students, teachers who collaborate in developing curriculum and taking responsibility for students, and closer connections to institutions like firms are all improvements that schools could undertake even if they have no interest whatsoever in the vocational purposes of education. The emphasis that gives a distinctive flavor to academies, focus schools, and occupational clusters could be achieved in other ways: an academy or focus school could concentrate on environmental issues, the special problems of cities, math and science, or the humanities — rather than a cluster of occupations.

But even if an occupational focus is only one of several ways to reform the high school, it provides some obvious advantages over other approaches. In attempting to integrate different subjects, teachers are required to collaborate and to remedy the deficiencies of the traditional academic teaching style. In developing focused programs, educators must decide the content of a coherent curriculum, consider how students can learn to make intelligent choices about their futures, and determine the connection between the school and the rest of society (including economic institutions). The efforts to integrate academic and vocational education force teachers to balance the varied capacities — general and specific, "academic" and "vocational," manipulative and behavioral as well as cognitive — that successful individuals must possess.

Above all, an occupational focus as a mechanism for reform takes seriously the vocational nature of the high school, rather than hiding it. For all of these reasons, the effort to integrate academic and vocational education may be the best stimulus to reconstruct the American high school.

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Facts on Working Women

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WOMEN IN THE SKILLED TRADES AND IN OTHER MANUAL OCCUPATIONS

WOMEN IN THE TRADES--A FIVE-YEAR REVIEW. The number of women in the skilled trades rose only modestly in the 5-year period ending in 1988. The 1.2 million women employed as precision production, craft, and repair workers represented only 8.7 percent of such workers compared with 8.1 percent in 1983 (1.0 million). (See Table I.) Women were 26 percent of other manual workers--operators, fabricators, and laborers, about the same proportion they were 5 years before (27 percent). Within these broad occupational groups, women remain concentrated in a few "traditionally female" categories such as dressmakers, textile sewing machine operators, and electrical and electronic equipment assemblers in which women use their homemaking skills or which require hand or finger dexterity.

In 1988 only 2 percent of all employed women were in the skilled trades--precision production, craft, and repair occupations--the same proportion as in 1983. About 9 percent of employed women were in other manual jobs--operators, fabricators, and laborers--edging slightly downward from 1983 when 10 percent were so employed. More than 40 percent of employed men worked in these two major occupational groupings.

WOMEN IN THE SKILLED TRADES--PRECISION PRODUCTION, CRAFT, AND REPAIR. The skilled trades--precision production, craft and repair--include mechanics and repairers; the construction trades and extractive occupations; and precision production occupations. (See Table II.)

Mechanics and Repairers--Women represented 3 percent of mechanics and repairers in 1988, the same proportion as in 1983. The largest proportion of women was among telephone installers and repairers (12 percent). Women were also 10 percent of telephone line installers and repairers and 9 percent of data processing equipment repairers. Women were in smaller proportions in other mechanic and repairer jobs.

Construction Trades and Extractive Occupations--Of persons in the construction trades in 1988, 2 percent were women--about the same as in 1983. Women were 6 percent of painters, construction and maintenance workers and 5 percent of insulation workers but in much smaller proportions in other construction trade occupations. Women were also only 2 percent of persons in extractive occupations.

Precision Production Occupations--Precision production occupations include those requiring a high degree of precision in the tasks performed, for the attainment of standards. These occupations in many cases require an ability to interpret detailed instructions and specifications. The amount of time spent in training for the exercise of these occupations is substantial, in most cases at least 6 months to a year and in many cases several years.

Women held nearly 24 percent of precision production occupations in 1988, up slightly from nearly 22 percent in 1983. Women accounted for 94 percent of dressmakers--a case of women's traditional skills being transferred from the home to the workplace--and 70 percent of electrical and electronic equipment assemblers, an occupation that requires great finger and hand dexterity. On the other hand, women were only 2 percent of tool and die makers.

WOMEN IN OTHER MANUAL OCCUPATIONS--OPERATORS, FABRICATORS, AND LABORERS.

Operators, fabricators, and laborers make up other manual workers. (See Table II.) These workers include: machine operators, assemblers and inspectors; transportation and material moving occupations; and handlers, equipment cleaners, helpers, and laborers. Women represented 41 percent of machine operators, assemblers and inspectors in 1988, about the same as in 1983 (42 percent). About 90 percent of textile sewing machine operators were women. On the other hand, only 5 percent of welders and cutters were women.

The proportion of transportation and material moving jobs held by women edged up from 8 percent in 1983 to 9 percent in 1988, with women representing 49 percent of bus drivers but less than 1 percent of workers in locomotive operating occupations.

Women's representation among handlers, equipment cleaners, helpers, and laborers was the same in 1988 as in 1983 (17 percent). Women were 65 percent of hand packers and packagers but only 3 percent of construction laborers.

EMPLOYED WOMEN TRADES WORKERS, BY INDUSTRY. Manufacturing industries had the highest proportions of women in the skilled trades. About 18 percent of skilled trades workers in nondurable goods manufacturing and 16 percent of similar workers in durable goods manufacturing were women. In contrast, only 2 percent of skilled trades workers in mining and 2 percent of those in construction were women, in 1988.

Women were more likely to work as operators, fabricators, and laborers in the professional services industries, where they represented half of the persons employed in such occupations. Nearly half (47 percent) of similar workers in nondurable goods manufacturing were women. On the other hand, only 3 percent of operators, fabricators, and laborers in the construction industry and 4 percent of similar workers in the mining industry were women.

EARNINGS OF TRADES WORKERS. Women in the trades--both in the skilled trades and other manual occupations--earned 68 percent of the earnings of similarly employed men in 1988. (Among all workers, women earned 70 percent of men's earnings.) Women who usually work full time in the skilled trades--precision production, craft, and repair--had median weekly earnings in 1988 of $302 compared with $446 for men. Women in the skilled trades had weekly earnings slightly less than the median of all women workers ($315). In fact, median earnings of women skilled trades workers were slightly below those of women in administrative support occupations ($305) but exceeded those of all other major groups except managerial, professional, and technical.

In some individual skilled trades, workers earned well above the median weekly earnings of all women workers ($315). For example, tool and die makers earned $575, telephone installers and repairers earned $573, and electrical power installers and repairers earned $554. Workers in extractive occupations had median weekly earnings of $504.

CHARACTERISTICS OF WOMEN IN THE TRADES--AGE, MARITAL STATUS, AND RACE/ETHNIC GROUP

Age and Marital Status

Most women in precision production, craft, and repair work were age 35 and over (58 percent) compared with 53 percent for all women workers. Most were married, husband present (55 percent); 21 percent had never married; 14 percent were divorced; and 5 percent each were separated or widowed. Among all women in the work force, 56 percent were married, husband present; 12 percent were divorced; 4 percent each were separated or widowed; and 24 percent had never married.

Race and Ethnic Origin

The Skilled Trades--Black and Hispanic origin women hold very small proportions of all skilled trades jobs but were one-fifth of women employed in the skilled trades. Black women represented only 1 percent of all persons in the skilled trades--precision production, craft, and repair occupations--but were 11 percent of all women skilled trades workers. As was the pattern of all women skilled trades workers, black women employed in those occupations were more likely to work as electrical and electronic equipment assemblers (24,000). Another 23,000 were supervisors in production occupations and another 19,000 were butchers and meat cutters.

The 104,000 women of Hispanic origin who worked in the skilled trades represented less than 1 percent of all persons in precision production, craft, and repair occupations and about 9 percent of all women employed in those trades. Hispanic women were also most likely to be employed in precision production jobs with 28,000 employed as electrical and electronic equipment assemblers. Another 16,000 were supervisors in production occupations and 11,000 were dressmakers.

There were no black or Hispanic women employees reported in extractive occupations, in many mechanic and repairer jobs, or in most construction trades.

Other Manual Occupations--As in the case for all women workers, black and Hispanic origin women were more likely to hold manual occupations other than in the skilled trades. Black women represented 4 percent of all persons employed in other manual occupations, i.e., as operators, fabricators, and laborers. These 765,000 black women were nearly 17 percent of all women employed in these occupations. Black women employed in these occupations worked primarily as machine operators, assorted materials (160,000), and as textile sewing machine operators (121,000).

Hispanic women represented 3 percent of all persons employed as operators, fabricators, and laborers and 12 percent of all women employed in these occupations. Hispanic women employed in these manual occupations were also more likely to be machine operators, with 135,000 employed as textile sewing machine operators and 128,000 as machine operators, assorted materials.

APPRENTICESHIPS AND OTHER TRAINING.

Apprenticeship is a prescribed paid learning experience during which an individual, called an apprentice, learns a trade through several years of on-the-job training and related instruction. It offers the opportunity to pursue progressively more complex on-the-job work under the tutelage of a master craft worker which, when combined with supplemental instruction, leads to a highly skilled job, and a recognized certificate of completion of the prescribed apprenticeship program. Apprenticeship programs are commonly registered with the Federal Government or a federally approved State apprenticeship agency. Registered programs offer apprenticeships in over 800 occupations such as carpenter, plumber, aircraft mechanic (electrical and radio), tool and die maker, T.V. and radio repairer, and others. Apprentices who successfully complete registered programs receive certificates of completion from the U.S. Department of Labor or a federally approved State apprenticeship agency. Most registered programs are sponsored jointly by employers and labor unions. The administrative body in such joint programs is called a Joint Apprenticeship Committee (JAC). Currently, there are approximately 44,000 program sponsors and more than 300,000 registered apprentices.

Latest data indicate that women's participation in apprenticeable programs is growing. As indicated in Table III, the number and proportion of women apprentices have increased in recent years. From 1978 to 1988, the percentage of females registered as apprentices increased from 3.1 percent of the total to 7.0 percent for the first quarter of FY 1989.

Women face unique obstacles to apprenticeship--traditionally a male domain. For example, women may have to contend with stereotypical attitudes concerning the kinds of work they can or should handle. Although more women are entering apprenticeship programs and being accepted by their male peers, many feel they need more self-confidence in addition to the abilities required of all apprentices.

Women are acquiring the necessary education and training to meet the skills requirements for entry into the trades. The minimum levels of education required for entry into apprenticeship programs vary. However, a high school education is usually required. Seven percent of women employed in precision production, craft, and repair jobs had completed 4 years of college or more compared with 5 percent of similarly employed men. About 51 percent of women so employed and 54 percent of men had completed 4 years of high school only. Both women and men employed in those occupations had completed a median of 12.5 years of schooling.

Another form of training for entry into the trades is vocational education. In October 1982, 2 million women, representing 54.8 percent of all enrollees, were participants in post-secondary vocational education programs, in an occupational or technical field for the purpose of obtaining a vocational credential, such as a certificate, occupational license, or other diploma or degree.

In a 1984 report on how workers get their training, it was found that qualifying training was necessary for 65 percent of the 11.7 million persons employed in precision production, craft, and repair occupations--somewhat greater than the average for all workers. Sources of training included school, informal on-the-job training, formal company programs, correspondence courses, the Armed Forces, or friends and relatives. Precision production and craft workers exceeded the average for all workers in all sources of training except school. On-the-job training was the predominant source of training for carpenters, plumbers, office machine repairers, and many other workers in precision production, craft, and repair work.

OUTLOOK TO THE 21ST CENTURY.

The number of precision production, craft, and repair jobs is projected to grow more slowly than the average for total employment from 1988 to 2000, just as it did from 1976 to 1988. Nearly all of the 1.4 million total increase in jobs is expected to be in the construction and services industry division. In manufacturing, about 100,000 fewer workers in this major group are projected to be employed in 2000 than in 1988.

Employment in the operators, fabricators, and laborers group, which grew by only 3 percent from 1976 to 1988 is projected to grow by about 1 percent through the year 2000. Although a large decline of nearly three-fourths of a million jobs is projected in manufacturing, job gains in services; wholesale and retail trade; construction; and transportation, communications, and public utilities should result in a net gain of 215,000 jobs by 2000.

This major group is expected to have the largest change in the share of total employment, declining from 14.4 percent in 1988 to 12.6 percent by 2000.

Still, new openings in these areas should provide increased opportunities for women, the major source of entrants into the labor force over the next 12 years. It is projected that women will account for 52 percent of the nearly 43 million workers who will enter the labor force between 1988 and the year 2000.

In a recent National Academy of Sciences study of job segregation, by sex, it was found that despite recent changes in attitudes and new challenges to old beliefs, a variety of barriers--legal, institutional and informal--still limit women's access to occupations in which men have customarily predominated. These include, for example, requirements for nonessential training or credentials that women often lack, preemployment barriers to relevant job training such as age restrictions for apprenticeships, and factors such as work climate, harassment, and sponsorship.

Employment of women in the trades will increase as institutional change reflects reappraisal of sex segregation of jobs and as women continue to prepare for the highly skilled jobs of tomorrow. The U.S. Department of Labor is responsible for ensuring that regulations regarding equal employment opportunity are carried out and, led by the Bureau of Apprenticeship and Training, works to promote increased participation of women in apprenticeship programs. It is anticipated that the next century will provide improved opportunities for women in employment, particularly in nontraditional areas such as the trades.

TABLE I
PERSONS EMPLOYED IN THE TRADES, BY SEX
1983 AND 1988
(Numbers in thousands)

	Precision Production, Craft and Repair	Operators, Fabricators, Laborers
1988		
Total persons employed	13,664	17,814
Total women employed	1,190	4,580
Women as percent of total	8.7	25.7
1983		
Total persons employed	12,328	16,091
Total women employed	1,000	4,282
Women as percent of total	8.1	26.6

TABLE II
PERSONS EMPLOYED IN THE TRADES, BY SEX AND DETAILED OCCUPATIONS, 1983 AND 1988

	1988		1983	
	Total persons employed (in thousands)	Women as percent of total	Total persons employed (in thousands)	Women as percent of total
PRECISION PRODUCTION, CRAFT, AND REPAIR	13,664	8.7	12,328	8.1
Mechanics and repairers	4,454	3.3	4,158	3.0
Supervisors	256	7.1	252	7.0
Mechanics and repairers, except supervisors	4,198	3.1	3,906	2.8
Vehicle and mobile equipment mechanics and repairers	1,811	0.9	1,683	0.8
Automobile mechanics	879	0.7	800	0.5
Bus, truck, and stationery engine mechanics	325	0.5	299	0.6
Aircraft engine mechanics	131	3.7	95	2.5
Small engine repairers	70	0.6	63	0.1
Automobile body and related repairers	194	1.0	199	0.7
Heavy equipment mechanics	159	0.5	162	0.7
Industrial machinery repairers	547	2.7	529	2.2
Electrical and electronic equipment repairers	677	8.0	674	7.4
Electronic repairers, communications, and industrial equipment	165	5.0	155	5.3
Data processing equipment repairers	140	8.8	98	9.3
Telephone line installers and repairers	61	10.0	59	5.6
Telephone installers and repairers	202	12.1	247	9.9
Heating, air conditioning, and refrigeration mechanics	262	0.6	200	0.5
Miscellaneous mechanics and repairers	874	4.5	792	4.0
Office machine repairers	60	6.4	66	3.3
Millwrights	96	2.1	94	1.0
Construction trades	5,096	2.3	4,289	1.8
Supervisors	617	2.2	504	1.3

	1988		1983	
	Total persons employed (in thousands)	Women as percent of total	Total persons employed (in thousands)	Women as percent of total
Construction trades, except supervisors	4,481	2.1	3,784	1.9
Brickmasons and stonemasons	202	0.5	156	0.3
Tile setters, hard and soft	53	1.2	--	--
Carpet installers	108	2.3	88	2.0
Carpenters	1,427	1.5	1,160	1.4
Drywall installers	149	2.1	95	1.4
Electricians	701	1.4	602	1.5
Electrical power installers and repairers	101	0.4	106	0.2
Painters, constructions, and maintenance	525	5.8	473	4.9
Plumbers, pipefitters, and steamfitters	494	0.4	443	1.1
Concrete and terrazo finishers	85	0.2	64	--
Insulation workers	54	4.9	56	4.8
Roofers	156	1.2	133	0.1
Structural metal workers	48	0.4	63	1.2
Extractive occupations	144	2.1	196	2.3
Precision production occupations	3,968	23.5	3,685	21.5
Supervisors	1,361	15.4	1,210	14.1
Precision metal working	896	6.3	892	5.5
Tool and die makers	145	2.4	148	1.2
Machinists	497	4.8	471	4.1
Sheet-metal workers	126	5.7	127	4.5
Precision woodworking occupations	106	11.8	86	16.7
Cabinet makers and bench carpenters	66	2.6	--	--
Precision textile, apparel and furnishings machine workers	296	58.1	260	58.9
Dressmakers	126	94.4	111	96.1
Upholsterers	84	22.0	67	20.2
Precision workers, assorted materials	529	56.7	452	56.9
Optical goods workers	60	61.4	56	41.5
Dental laboratory and medical appliance technicians	49	32.9	50	41.1
Electrical and electronic equipment assemblers	305	70.0	246	74.2
Precision food production occupations	418	32.4	408	25.5
Butchers and meat cutters	258	21.2	276	15.6

	1988		1983	
	Total persons employed (in thousands)	Women as percent of total	Total persons employed (in thousands)	Women as percent of total
Bakers	126	47.5	105	44.4
Precision inspectors, testers and related workers	126	28.1	130	25.6
Inspectors, testers, and graders	113	25.6	121	24.6
Plant and system operators	236	4.5	247	3.4
Operators, fabricators, and laborers	17,814	25.7	16,091	26.6
Machine operators, assemblers, and inspectors	8,117	40.8	7,744	42.1
Textile sewing machine operators	749	90.1	806	94.0
Welders and cutters	555	4.9	543	5.0
Transportation and material moving operations	4,831	9.0	4,201	7.8
Bus drivers	450	48.5	365	45.5
Locomotive operating occupations	51	0.5	64	2.3
Handlers, equipment cleaners, helpers, and laborers	4,866	17.2	4,147	16.8
Construction laborers	799	3.4	595	2.1
Hand packers and packagers	298	65.3	286	67.0

TABLE III
WOMEN IN APPRENTICESHIPS, END OF PERIOD FY'S 1978, 1983, 1988, and 1st Qtr. FY 1989

	Number	Percent of Total
1989	18,184	7.0
1988	17,239	6.8
1983	16,710	6.6
1978	8,997	3.1

IS YOUR CLASSROOM FREE OF SEX BIAS?

A Checklist of Equitable Teaching Practices

Classroom Organization

Do you...

____Examine enrollment patterns to identify possible sex bias?
____Establish and apply the same grading system to students of both sexes?
____Set the same standards of behavior for all students in your classroom?
____Apply the same standards for use of tools and equipment to all students?
____Have the same safety rules for both boys and girls?
____Keep libraries well-stocked with catalogues of bias-free materials?
____Examine, replace and supplement biased materials?
____Assign classroom tasks (operating projector, cleaning) on the basis of skills and interest, not gender?
____Avoid separating boys and girls for seating, teams, lining up, etc.?
____Rearrange the room regularly so that you have a chance to move around the room and interact with different students?
____Arrange opportunities for boys and girls to work together?
____Encourage students to experience a variety of roles within a group?

Instructional Techniques

____Address all students with the same tone of voice?
____Use gender-free terms and occupational titles?
____Make course descriptions and content appealing to all students, regardless of gender?
____Refrain from using terms like "broken home," "latchkey child," or "child of a single parent"?
____Provide the same learning activities and projects for all students rather than different ones on the basis of sex, such as more labs for boys or more seatwork for girls?
____Expect the same work habits from both boys and girls?
____Evaluate standards and expectations to determine if differences are the result of sex role stereotyping?
____Pay close attention to patterns of classroom interaction?
____Give equitable attention to students of both sexes?
____Use parallel terminology when addressing male and female students, or referring to men and women in examples (i.e. "When the chemist works, she must...")?

Student Interaction

_____Encourage students to consider a broader range of program and career options?
_____Encourage use of all tools and equipment in the classroom?
_____Recognize skill areas that may require extra encouragement (e.g. math for girls, drama for boys)?
_____Avoid making statements that would make students think that boys must act one way and girls another way (e.g. "Boys will be boys," "Act like a lady")?
_____Give equivalent attention to students of both sexes (instead of more criticism for the boys or support for the girls)?
_____Have the same health and dress guidelines for both sexes?
_____Recognize all athletic achievements and events?
_____Support students in behavior that is not limited by their sex role stereotype?
_____Help students, boys and girls, to share feelings and cope with stress in a healthy manner?
_____Accept emotional expression from both sexes?
_____Support "pioneer" students who take a chance on fields of study that are not traditional for their sex?
_____Administer the same disciplinary actions to boys and girls?
_____Avoid comparisons of boys and girls with respect to classroom behavior, attitudes and accomplishments?
_____Help students understand the difference between sex roles and gender identity?
_____Ask students to tell you when you are treating male and female students differently?

Information Sharing

_____Make it clear to students that they do not have to conform to rigid sex roles, but just be themselves?
_____Point out when textbooks, films, and other materials show men and women only in stereotyped ways?
_____Share information with both sexes about their future dual roles as worker/parent?
_____Provide students with nontraditional role models in books, displays, and guest speakers?
_____Maintain a file on role models and volunteers who have worked with students?
_____Share information with students about the structure of the contemporary American family?

STRATEGIES TO ENCOURAGE NON-TRADITIONAL CAREER CHOICES

Successful non-traditional career recruitment and retention programs tend to have the following characteristics:

1. Educational staff have received training in sex equity and are committed to that goal.

2. School district officials are committed to the goal of sex equity and may even choose to designate one staff member to oversee efforts in the district.

3. Nontraditional role models, particularly former students who have graduated and succeeded in pioneering fields, are provided to show students that success and job satisfaction are possible.

4. Faculty accept and encourage nontraditional students.

5. Prospective students in nontraditional areas are allowed the time to try out any machinery, tools, etc. that are required or a particular career so that what is unfamiliar becomes familiar.

6. Linkages are created and maintained throughout the community with parent groups to ensure their support and with the business/ industry community to ensure that school programming meets their employment needs.

7. Educational staff "mainstreams" special programs for nontraditional students so that services for pioneering students become the rule and not the exception.

Suggestions from one successful program (Ysleta Independent School District, El Paso, Texas):

1. Eighth grade students are given a tour of their comprehensive high school or career center by a student guide who is enrolled in a

nontraditional career. Faculty at the vocational school or career center are prepared to discuss employment opportunities in their field.

2. A "Futures Week" exposes students to nontraditional career choices by integrating information about them into the curriculum. Writing, reading, science, and math classes sponsor Futures Week activities. Field trips to local government offices and business and industry sites allow students to observe people in nontraditional careers and speak with employers. Vocational teachers sponsor a Career Night for parents to illustrate the advantages of nontraditional career choices and to encourage parents to take a more active role in their children's education. A Career Day, featuring a wide array of career choices, caps off the week.

3. An "open house" program wherein students and parents are invited to participate together, allows men and women in nontraditional careers to meet with students and parents and answer questions.

4. Students have access to "shadowing" programs that allow them to shadow an employee for a day.

5. A community outreach program allows vocational educators to speak in a variety of settings to community groups and parents.

6. Workshops are established that bring together vocational educators and business and industry members, particularly those in nontraditional careers. Workshops provide information on current job training and opportunities and contacts for role models and future programming.

7. A series of inservice courses are offered regularly to help keep faculty and administrators current on sex equity issues.

RESOURCES FOR EDUCATORS AND PARENTS:
AN ANNOTATED BIBLIOGRAPHY ON WOMEN AND MATHEMATICS

AN AGENDA FOR ACTION. (1980) National Council of Teachers of Mathematics, 1906 Association Dr, Reston, VA 22091.
Recommendations for school mathematics of the 1980's.

ANALYSIS OF MODE: MATH OPENS DOORS EVERYWHERE, by Eileen L. Poiani. *American Mathematical Monthly* 87 (June-July 1980), 462-65.
Report on MODE career conference for guidance counselors.

...AND GLADLY TEACH, Urban Mathematics Collaboratives, c/o Mark Driscoll, Education Development Center, 55 Chapel Hill, Newton, MA 02160. 617-969-7100. Free.
Report on the Urban Mathematics Collaboratives, coalitions of public school teachers, business leaders, and university educators in eleven urban centers who sponsor a wide variety of programs designed to improve mathematics education in inner-city schools and to create new models for meeting teachers' professional needs. 40 pp.

APPLICATIONS OF SECONDARY SCHOOL MATHEMATICS, by Bernice Kastner. (1978) National Council of Teachers of Mathematics, 1906 Association Dr, Reston, VA 22091.
Exemplifies the use of such topics as calculus, geometry, matrices, logarithms, and proportions using problems from economics, astronomy, physics, music, etc.

ART 'N' MATH: MATH LESSONS GRADES 6-12, by Karen Billings, Carol Campbell, and Alice Schwandt. (1975) Action Math Associates, 1358 Dalton Dr, Eugene, OR.

AWIS-CAC COMPILATION OF RECOMMENDED CAREER GUIDANCE RESOURCES, Association for Women in Science, 2401 Virginia Ave NW, Suite 303, Washington DC 20037. 202-833-1998. $2.
Lists books, films, curricular materials, etc.

BE A COMPUTER LITERATE, by Marion J Ball & Sylvia Charp. (1977) Creative Computing, Box 789M, Morristown, NJ 07960.
Describes computer uses, how to communicate with them, and their impact on our lives. Directed towards the high school and junior high school level.

BEYOND PICTURES AND PRONOUNS: SEXISM IN TEACHER EDUCATION TEXTBOOKS, by Myra Sadker and David Sadker. (1979) Office of Education, Washington DC.

BUILDING SUCCESS IN MATH, by Carol Langbort and Virginia Thompson. (1985) Wadsworth Publishing, Belmont, CA.
Workbook for adults teaches mathematical skills and builds confidence.

THE CAREER OPTIONS HANDBOOK. (1977) Cristin White Associates, Box 112, Newton, MA 02195. 617-964-0928.
This handbook describes a Career Awareness Program developed in the Boston area to provide an alternative to the directionless, self-destructive behavior of some girls. The handbook, a video tape about the career options program, and information about establishing the program are available.

CAREERS IN MATHEMATICS. Association for Women in Mathematics, Box 178, Wellesley College, Wellesley, MA 02181.
Describes several mathematical specialties and career opportunities available within them; provides a brief "road map" of the relationships among different areas of mathematics. Appropriate for high school or college or general interest. Free; self-addressed stamped envelope (39¢) requested.

CAREER INFORMATION SYSTEM (CIS), 217 Hendricks Hall, University of Oregon, Eugene, OR 97403. 503-686-3872.
Consortium compiles career information and provides it to schools, social agencies, and individuals in usable forms.

A CLASSROOM EXPERIMENT INVOLVING BASIC MATHEMATICS AND WOMEN, by Pansy Waycaster Brunson. *Two-Year College Math Journal* 14:4 (Sept 1983), 318-21.

COMETS: SCIENCE AND COMETS PROFILES. (1984) National Science Teachers Association, Special Publications Department, 1742 Connecticut Ave NW, Washington DC 20009.
Science activities and profiles of women scientists suitable to students in grades 5-9. Computer activities and practice with math skills.

THE CRITICAL ROLE OF ELEMENTARY SCHOOL MATHEMATICS IN EQUALIZING OPPORTUNITY, by Lucy W. Sells. *Arithmetic Teacher*, September 1981, 44-45. National Council of Teachers of Mathematics, 1906 Association Dr, Reston, VA 22091.

DIFFERENTIAL TREATMENT OF FEMALES AND MALES IN MATHEMATICS CLASSES, by J.R. Becker. (1981) *Journal for Research in Mathematics Education* 12, 40-53.

THE DISADVANTAGED MAJORITY: SCIENCE EDUCATION FOR WOMEN, by J.B. Kahle. (1983) Carolina Biological Supply Company, Burlington, NC.

ELEMENTARY SCHOOL MATHEMATICS: WHAT PARENTS SHOULD KNOW ABOUT... ESTIMATION. (1982) The National Council of Teachers of Mathematics, 1906 Association Dr, Reston, VA 22091.
Pamphlet on tips for parents to help their children learn to estimate.

EQUALS: AN ANNOTATED BIBLIOGRAPHY ON CLASSROOM ACTIVITIES FOR ELEMENTARY AND SECONDARY SCHOOL TEACHERS TO USE IN TEACHING PROBLEM SOLVING AND MATHEMATICS, by Ruth Afflack, Rita Liff, Diane Downie, and Twila Slesnick. (1977) Equals, Laurence Hall of Science, University of California, Berkeley, CA 94720.

EQUALS: AN ANNOTATED BIBLIOGRAPHY TO ASSIST ELEMENTARY AND SECONDARY SCHOOL TEACHERS IN SEX-FAIR COUNSELING AND INSTRUCTION, by Valerie Wheat. (1977) Equals, Laurence Hall of Science, University of California, Berkeley, CA 94720.

Sponsored by the AMS-ASA-IMS-MAA-NCTM-SIAM Joint Committee on Women in the Mathematical Sciences
and Women and Mathematics (WAM)
Available from the Association for Women in Mathematics, Box 178, Wellesley College, Wellesley, MA 02181
Duplication and distribution encouraged.

ERIC (EDUCATIONAL RESOURCES INFORMATION CENTER). Clearing House for Science, Mathematics, and Environmental Education, Ohio State University, 1200 Chambers Rd, 3rd floor, Columbus, OH 43212. (614) 422-6717.

Comprehensive listing of publications, especially government publications, related to math education.

EXPANDING YOUR HORIZONS IN SCIENCE AND MATHEMATICS: A HANDBOOK FOR PLANNERS.

THE MATH-SCIENCE CONNECTION: EDUCATING YOUNG WOMEN FOR TODAY. 18 minute film or tape available for purchase or rental.

SANDRA, ZELLA, DEE AND CLAIRE: FOUR WOMEN IN SCIENCE. 18 minute film or tape available for purchase or rental.

EDC/WEAP Distribution Center, 55 Chapel St, Newton, MA 02160.

Booklet and first film help educators encourage women to consider science and math based careers. Second film is good for junior and senior high school students who are interested in science, explores the work and lives of four women.

FAMILY MATH. (1986) EQUALS, Lawrence Hall of Science, University of California, Berkeley, CA 94720. 415-642-1823. $15 plus $2 postage & handling (make out check to The Regents, U of CA).

Curriculum with activities appropriate for families, inservice clases, or Family Math courses K-8.

FOLK MATH, by Eugene Maier. *Instructor*, February, 1977.

Short, fun article on the importance of bridging the gap between school math and the math used in life.

GENDER DIFFERENCE AS A FACTOR IN TEACHERS' PERCEPTIONS OF STUDENTS, by R.S. Prawt and R. Jarvis. (1980) *Journal of Educational Psychology* 72, 743-49.

GIRLS AND MATHEMATICS: PARENTAL VARIABLES, by P. Stamp. (1979) *British Journal of Educational Psychology* 49, 39-50.

HANDBOOK FOR CONDUCTING EQUITY ACTIVITIES IN MATHEMATICS EDUCATION. (1984) National Council of Teachers of Mathematics, 1906 Association Dr, Reston, VA 22091.

HOW HIGH THE SKY? HOW FAR THE MOON? AN EDUCATIONAL PROGRAM FOR GIRLS AND WOMEN IN MATH AND SCIENCE, by Sharon Menard. (1982) WEEA Publishing Center, Newton, MA.

Short exercises for K-12 students on problem-solving skills and career information.

ENCOURAGING SCIENCE EDUCATION AND CAREERS. Association for Women in Science, 2401 Virginia Ave NW, Suite 303, Washington DC 20037. 202-833-1998. Free with SASE.

Lists resouces for educators and counselors. 2 pp.

HOW TO ENCOURAGE GIRLS IN MATH AND SCIENCE: STRATEGIES FOR PARENTS AND EDUCATORS, by Joan Skolnick, Carol Langbort, and Lucille Day. (1982) Dale Seymour Publications, PO Box 10888, Palo Alto, CA. $9.95 ppd.

Details sex-role socialization and provides specific strategies and activities to encourage learning math and science skills in preschool through grade 8. Includes resource list. Excellent.

"HOW TO" SERIES: GUIDES FOR CAREER EDUCATION. (1978) State Project to Implement Career Education, 227 W 27th St, New York, NY 10001.

Eight excellent reports on how to bring career education to schools. Two examples: "How to Develop the Librarians' Role in Career Education," "How to Develop and Use Community-Based Resources."

I CAN BE ANYTHING: CAREERS AND COLLEGES FOR YOUNG WOMEN, by Joyce Slayton Mitchell. (1975) College Board Publication Orders, Box 2815, Princeton, NJ 08540.

One page descriptions of careers, including education and training required, status of women in field, salaries, colleges awarding bachelor's degrees in the field, and addresses for further information. Photos depict women using tools of their trade or profession.

"I'M MADLY IN LOVE WITH ELECTRICITY" AND OTHER COMMENTS ABOUT THEIR WORK BY WOMEN IN SCIENC AND ENGINEERING, by Nancy Kreinberg. (1977) EQUALS, Lawrence Hall of Science, University of California, Berkeley, CA 94720. 415-642-1823. $2 plus 50¢ postage (make out check to The Regents, U of CA).

Quoted comments from 70 women about the work they do in private corporations, government laboratories, community colleges, and universities.

INCREASING WOMEN'S PARTICIPATION IN MATHEMATICS: AN INTERVENTION STUDY, by Elizabeth Fennema et al. *Journal for Research in Mathematics Education* 12:1 (Jan 1981), 3-14.

INTRODUCTORY MATH AND THE ADULT WOMAN STUDENT, by Carolyn T. MacDonald. *Two-Year College Mathematics Journal* 9:3 (June 1978), 158-61.

LEARNING WHAT'S TAUGHT: SEX DIFFERENCES IN INSTRUCTION, by G. Leinhart, A.M. Seewald, and M. Engel. (1979) *Journal of Experimental Psychology* 71, 432-39.

MATH FOR GIRLS AND OTHER PROBLEM SOLVERS, by D. Downie, T. Slesnick, and J. Stenmark. (1981) EQUALS, Lawrence Hall of Science, University of California, Berkeley, CA 94720. 415-642-1823. $10 plus $2 postage & handling (make out check to The Regents, U of CA).

K-8 curriculum with emphasis on problem solving activities, logic and patterns, breaking set, creative thinking, estimating and observing, and spatial visualization.

MATH GAMES FOR THE YOUNG CHILD, by Agnes Azzolin (1985) Mathematical Concepts, 85 First St, Keyport, NJ 07735.

MATH NEEDS OF PROSPECTIVE STUDENTS IN ENGINEERING AND SCIENCE. (1976) Engineering Publication Office, 112 Engineering Hall, University of Illinois at Urbana-Champaign, Urbana, IL 61801.

Guide to specific math requirements and anticipated high school course content for use by high school teachers and guidance counselors. Though requirements apply for University of Illinois, the material is of general interest.

MATHEMATICS: GATEWAY TO FUTURE CAREERS. (1981) National Council of Teachers of Mathematics, 1906 Association Dr, Reston, VA 22091.

15 minute full-color sound filmstrip on careers in mathematics.

MATHEMATICS AND CAREERS. (1979) National Council of Teachers of Mathematics, 1906 Association Dr, Reston, VA 22091.

A set of full-color posters and brochures for mathematics classrooms.

MATHEMATICS AND SEX, by John Ernest. *American Mathematical Monthly* 83 (October 1976), 595-613.

Reports on research on student and teacher attitudes and sex differences in attitudes. Includes excellent bibliography.

MATHEMATICS AT WORK IN SOCIETY: A CAREER AWARENESS PACKAGE. (1981) Mathematical Association of America, 1529 18th St NW, Washington, DC 20036.

Four video casettes and a project book directed at 8th to 10th graders. The materials show the role math plays in a wide range of career areas.

MATHEMATICS EDUCATION RESEARCH: IMPLICATIONS FOR THE '80s, by Elizabeth Fennema. (1981) Association for Supervision and Curriculum Development, 225 N Washington St, Alexandria, VA 22314.

MATHEMATICS TOMORROW, edited by Lynn Arthur Steen. (1981) Springer-Verlag, New York, NY.

Collection of essays on mathematics-related topics for a general adult audience.

MIND OVER MATH, by Stanley Kogelman and Joseph Warren. (1978) Dial Press, New York.

An excellent resource for math educators working with math anxious adults.

A MINDSET FOR MATH: TECHNIQUES FOR IDENTIFYING AND WORKING WITH MATH-ANXIOUS GIRLS, by Judy Genshaft and Jack Naglieri. (1988) Women's Educational Equity Act Publishing Center, EDC, 55 Chapel St, Newton, MA 02160.

Workbook includes a curriculum which can be incorporated into classroom activities or after-school programs. Includes two chapters of math activities.

MULTIPLYING OPTIONS AND SUBTRACTING BIAS, directed by Elizabeth Fennema. (1981) National Council of Teachers of Mathematics, 1201 16th St NW, Washington, DC 20036. 703-620-9840.

Four videotapes and workshop intervention programs for high school teachers, counselors, students, and parents. Goal is to eliminate sexism in math education; available singly or as a set.

NICE GIRLS DON'T STUDY MATHEMATICS: THE PERSPECTIVE FROM ELEMENTARY SCHOOL, by S.L. Boswell. (April 1979) Paper presented at the annual meeting of AERA, San Francisco, CA. ERIC Document ED 174477.

NOTHING BUT OPTIONS. (1984) Math/Science Network, Mills College, Oakland, CA 94613.

Award winning 17 1/2 minute videotape encouraging young women to study math by sharing information from people who use it in their careers. Includes information on an environmental scientist, systems analyst, electrical engineer, financial investment counselor, and computer graphic designer. Could be used with jr high, high school, or adult audiences. Available for rent or purchase.

OFF AND RUNNING. EQUALS, Lawrence Hall of Science, University of California, Berkeley, CA 94720. 415-642-1823. $12.50 plus $2 postage & handling (make out check to The Regents, U of CA).

Collection of EQUALS in Computer Technology off-line activities and information to increase teacher and student awareness of women and minorities in technology and to encourage cooperative learning in grades K-12.

OPTIONS UNLIMITED: WOMEN IN TECHNOLOGY VIDEOTAPES. Consortium for Educational Equity, Rutgers University, New Brunswick, NJ. (201) 932-2071.

Two half-hour videotapes, each featuring five women with rewarding careers.

PERSPECTIVES ON WOMEN AND MATHEMATICS, edited by Judith E. Jacobs. (1978) ERIC Clearinghouse for Science, Mathematics, and Environmental Education, Ohio State University, 1200 Chambers Rd, 3rd floor, Columbus, OH 43212. Document #166051.

THE POWER OF THE RAISED EYEBROW, by Grace M. Burton. (1977) *The School Counselor* 25:116-23.

RECOMMENDATIONS FOR THE PREPARATION OF HIGH SCHOOL STUDENTS FOR COLLEGE MATHEMATICS COURSES. Mathematical Association of America, 1529 18th St NW, Washington DC 20036.

Comprehensive statement on basic ingredients of adequate preparation for college mathematics.

REGARDLESS OF SEX, by Grace M. Burton. (April 1979) *The Mathematics Teacher*, 72: 261-70.

RESOURCES FOR EDUCATIONAL EQUITY. (1985 Catalog) Women's Educational Equity Act Program, 55 Chapel St, Newton, MA 02160.

REVEALING IMAGES, by Grace M. Burton. (March 1984) *School Science and Mathematics*, 89: 199-207.

SCIENCE CAREER EXPLORATION FOR WOMEN. (1978) National Science Teachers Association, 1742 Connecticut Ave NW, Washington, DC 20009. $5 plus $2 postage and handling.

For science teachers and counselors. Contains activities modules deisgned to help women students explore science related careers. 77 pp.

SCIENCE CAREER PROGRAMS. (1982) Research Triangle Institute, Research Triangle Park, NC.

National Science Foundation sponsored program to encourage females and minorities in grades 4-9. Information about skills, careers, salaries in format usable with students. Accompanying filmstrip and poster set.

SCIENCE: WOMEN'S WORK. (1982) National Science Foundation.

Half hour 16mm sound and color film.

SEX DIFFERENCES IN MATHEMATICS: HOW NOT TO DEAL WITH THEM, by Edith A. Luchins. (1979) *American Mathematical Monthly* 86, 161-68.

SEX EQUITY HANDBOOK FOR SCHOOLS, by Myra Pollack Sadker and David Miller Sadker. (1982) Longman, New York.

Sensitizes teachers to gender issues and provides both general and specific suggestions for fostering sex equity in the classroom. 331 pp.

SEX STEREOTYPING IN INSTRUCTIONAL MATERIALS AND TELEVISION: AWARENESS KIT. Women's Education Equity Communications Network, Far West Laboratory, 1855 Folsom St., San Francisco, CA 94103.

Aimed at parents and teachers. Reviews guidelines for evaluating material and worksheets.

SOCIALIZATION OF ACHIEVEMENT ATTITUDES AND BELIEFS: CLASSROOM INFLUENCES, by J. Eccles-Parsons, et al. *Child Development* 53 (1982), 322-54.

SOCIALIZATION OF ACHIEVEMENT ATTITUDES AND BELIEFS: PARENTAL INFLUENCES, by J. Eccles-Parsons, et al. *Child Development* 53 (1982), 310-21.

A SOURCE BOOK OF APPLICATIONS OF SCHOOL MATHEMATICS. (1980) National Council of Teachers of Mathematics, 1906 Association Dr, Reston, VA 22091.

Superb reference book for teachers. Includes applied problems grouped by high school course — arithmetic, algebra, geometry, trigonometry and logarithms, and combinatorics and probability. Solutions included. Several project problems are suggested. Index organizes problems by application.

SPACES: SOLVING PROBLEMS OF ACCESS TO CAREERS IN ENGINEERING AND SCIENCE. EQUALS, Lawrence Hall of Science, University of California, Berkeley, CA 94720. 415-642-1823. $13.50 plus $2 postage & handling (make out check to The Regents, U of CA).

Classroom activities for grades 4-10 that use mathematics and career information to develop problem-solving skills.

T-SHIRTS. New Victoria Printers, Inc, 7 Bank St, Lebanon, NH 03766.

T-shirts depicting Kovalevsky or Noether. Specify small, medium, or large.

TEACHERS AND SEX BIAS IN MATHEMATICS, by Elizabeth Fennema. *Mathematics Teacher*, March 1980, pp. 169-73.

Summarizes research on teacher attitudes that lead to differential achievement in mathematics.

TODAY'S CHANGING ROLES: AN APPROACH TO NON-SEXIST TEACHING, by the Resource Center on Sex Roles in Education. (1974) National Foundation for the Improvement of Education, Washington DC.

USE EQUALS TO PROMOTE THE PARTICIPATION OF WOMEN IN MATHEMATICS, by Alice Kaseberg, Nancy Kreinberg, and Diane Downie. (1983) EQUALS, Lawrence Hall of Science, University of California, Berkeley, CA 94720. 415-642-1823. $7.50 plus $2 postage & handling (make out check to The Regents, U of CA).

Handbook for educators with methods and materials for in-service and classroom programs to develop the mathematical skills of young women. Many good ideas.

A VERY SPECIAL BOOK, by Sharon L. Menard. (1979) WEEA Program, Washington DC.

WANTED: MORE WOMEN IN SCIENCE AND TECHNOLOGY. Committee on the Status of Women in Physics, 335 E 45th St, New York, NY 10017.

Describes careers in science and engineering and ways that teachers and counselors can encourage women to enter these careers.

WE ALL COUNT IN FAMILY MATH. EQUALS, Lawrence Hall of Science, University of California, Berkeley, CA 94720. 415-642-1823.

17-minute film or video of scenes from Family Math classes available for rental or purchase.

WHAT'S A TEACHER TO DO? by Grace M. Burton. (January 1977) *Utah Council of Teachers of Mathematics Newsletter*.

WOMEN AND MATHEMATICS EDUCATION 1985-86 RESOURCE LIST. Judith E. Jacobs, Education Dept, George Mason University, Fairfax, VA 22030.

WOMEN AND MATHEMATICS EDUCATION COMPUTER EQUITY REFERENCES. Judith E. Jacobs, Education Dept, George Mason University, Fairfax, VA 22030.

WOMEN IN MATHEMATICS: WAYS TO MAKE IT HAPPEN, by Grace M. Burton. (Fall 1978) *Florida Council of Teachers of Mathematics Newsletter*.

WOMEN IN SCIENCE, by Dinah Moche. American Association of Physics Teachers, Publications Department, Graduate Physics Building, SUNY at Stony Brook, Stony Brook, NY 11794.

A multimedia package presenting information about six wom scientists, including written materials, audio cassette tapes, and 35mm slides. A pamphlet describing package is available.

WOMEN, MATH, AND SCIENCE: A RESOURCE MANUAL. (1984) Center for Sex Equity in Schools, 1046 School of Education, University of Michigan, Ann Arbor, MI 48109.

WOMEN MATHEMATICIANS POSTER. (1983) Education Section, EOC, Overseas House, Quay St, Manchester M3 3HN, England.

Poster depicting six female mathematicians with brief biographical details.

WOMEN, NUMBERS, AND DREAMS, by Teri Perl and Joan Manning. (1985) National Women's History Project, Box 3716, Santa Rosa, CA 95402.

Chronicles the lives and works of twelve female mathematicians and presents activities for classroom use in upper elementary school.

RESOURCES FOR STUDENTS / CAREER INFORMATION / FINDING EMPLOYMENT: AN ANNOTATED BIBLIOGRAPHY ON WOMEN AND MATHEMATICS

EDUCATIONAL RESOURCES:

'67/77: A PROFILE OF RECENT WOMEN'S COLLEGE GRADUATES, Woman's College Coalition, 1725 K St NW, Washington, DC 20006. $6.
Tracks the undergraduate and subsequent life experiences of two recent graduating classes. 24 pp.

AMS NOTICES, American Mathematical Society, PO Box 6248, Providence, RI 02940. $3.
Special issue in December of each year lists assistantships and fellowships in the mathematical sciences.

BE A COMPUTER LITERATE, by Marion J Ball & Sylvia Charp. (1977) Creative Computing, Box 789M, Morristown, NJ 07960.
Describes computer uses, how to communicate with them, and their impact on our lives; for high school and junior high school.

BUILDING SUCCESS IN MATH, by Carol Langbort and Virginia Thompson. (1985) Wadsworth Publishing, Belmont, CA.
Workbook for adults teaches mathematical skills and builds confidence.

EDUCATIONAL PROGRAMS IN OPERATIONS RESEARCH. Operations Research Society of America, Mount Royal & Guilford Aves, Baltimore, MD 21202. 301-528-4146. Up to 3 copies free.

FINANCIAL AID: A PARTIAL LIST OF RESOURCES FOR WOMEN. (1987) Project on the Status and Education of Women, Association of American Colleges, 1818 R St NW, Washington DC 20009. $3.50.
General information, selected listing of scholarships, and extensive listing of other resources. Very useful resource.

FOLK MATH, by Eugene Maier. *Instructor*, February 1977.
Short, fun article on the importance of bridging the gap between school math and the math used in life.

GRANTS-AT-A-GLANCE. (1987) Association for Women in Science, 2401 Virginia Ave NW, Suite 303, Washington DC 20037. 202-833-1998. $8 plus 75¢ postage and handling.
Listing of more than 350 awards, fellowships, and grants for students and professionals in science.

HIGH SCHOOL PREPARATION FOR A BACHELOR OF SCIENCE DEGREE IN ENGINEERING. (1982) Society of Women Engineers, United Engineering Center, Room 305, 345 E 47th St, New York, NY 10017.
Career information pamphlet for high school students.

HOW TO STUDY MATHEMATICS, by James Margenau and Michael Sentlowitz. (1977) National Council of Teachers of Mathematics, 1906 Association Dr, Reston, VA 22091.
Good pointers for improving study habits.

THE MATH IN HIGH SCHOOL. . . YOU'LL NEED FOR COLLEGE. (1978)
YOU WILL NEED MATH.
Mathematical Association of America, 1529 18th St NW, Washington, DC 20036.
Comprehensive information for high school students on mathematical preparation needed for college and career.

MATHEMATICS TOMORROW, edited by Lynn Arthur Steen. (1981) Springer-Verlag, New York, NY.
Collection of essays on mathematics-related topics for a general adult audience.

MEETING COLLEGE COSTS. (Revised yearly) Editorial Office, College Entrance Examination Board, 888 Seventh Ave, New York 10019.
Discusses how much college costs, how to determine if you need financial aid, and how to apply for aid.

MIND OVER MATH, by Stanley Kogelman and Joseph Warren. (1978) Dial Press, New York.
An excellent resource for math educators working with math anxious adults – or for the math anxious themselves.

NEED A LIFT? American Legion, PO Box 1055, Indianapolis, IN 46202.
Information on careers, scholarships, and loans.

OVERCOMING MATH ANXIETY, by Sheila Tobias. (1978) W.W. Norton & Co, New York.
Must reading for math anxious adult women.

PROFESSIONAL TRAINING IN MATHEMATICS. American Mathematical Society, PO Box 6248, Providence, RI 02940. $5.
Provides information and guidance for students interested in graduate study in mathematics.

PROGRAMS IN SCIENCE, MATHEMATICS, AND ENGINEERING FOR WOMEN IN THE UNITED STATES, by Michele L. Aldrich and Paula Quick Hall. (1980) American Association for the Advancement of Science, 1776 Massachusetts Ave NW, Washington, DC.
An inventory of programs for elementary school through graduate school and reentry.

RECOMMENDATIONS FOR STUDY, Casualty Actuarial Society, One Penn Plaza, 250 W 34th St, New York, NY 10119. Free.

YOUR NUMBER'S UP: A CALCULATED APPROACH TO SUCCESSFUL MATH STUDY, by C. Ann Oxrieder and Janet P. Ray. (1982) Addison-Wesley, Reading, MA.
Discusses math anxiety, what math is and is not, reasons for studying math, and self-management skills in overcoming roadblocks to success in math. Several chapters deal with problem solving.

Sponsored by the AMS-ASA-IMS-MAA-NCTM-SIAM Joint Committee on Women in the Mathematical Sciences
and Women and Mathematics (WAM)
Available from the Association for Women in Mathematics, Box 178, Wellesley College, Wellesley, MA 02181
Duplication and distribution encouraged.

CAREER INFORMATION:

ACCOUNTANT. Careers, Inc., PO Box 135, Largo, FL 33540. 95¢ ppd.

THE ACTUARIAL PROFESSION. Society of Actuaries, 500 Park Blvd, Suite #44D, Itasca, IL 60143. 312-772-3010. Free.

ACTUARIES. (1982)
COMPUTER PROGRAMMERS. (1979)
STATISTICIANS. (1978)
WHY NOT MATHEMATICS? (1971)
Chronicle Guidance Publications, Moravia, NY 13118.

AWIS-CAC COMPILATION OF RECOMMENDED CAREER GUIDANCE RESOURCES, Association for Women in Science, 2401 Virginia Ave NW, Suite 303, Washington DC 20037. 202-833-1998. $2.
Lists books, films, curricular materials, etc.

BIBLIOGRAPHY ON CAREERS IN MATHEMATICS AND RELATED FIELDS.
CAREERS IN APPLIED MATHEMATICS.
Society of Industrial and Applied Mathematics (SIAM), 1405 Architects Building, 117 South 17th St, Philadelphia, PA 19103.

CAREER INFORMATION SYSTEM (CIS), 217 Hendricks Hall, University of Oregon, Eugene, OR 97403. 503-686-3872.
Consortium compiles career information and provides it to schools, social agencies, and individuals in usable forms.

CAREER MATHEMATICS: INDUSTRY AND THE TRADES. (1977) Houghton Mifflin Co, One Beacon St, Boston, MA 02108. $6.99; 436 pp.

CAREERS FOR WOMEN IN MATHEMATICS. Association for Women in Mathematics, Box 178, Wellesley College, Wellesley, MA 02181. 617-235-0320 x.2643. Free (25¢ stamp requested).
General information about careers in mathematics; appropriate for high school or early college levels.

CAREERS IN APPLIED MATHEMATICS. Society for Industrial and Applied Mathematics, 117 S 17th St, Suite #1400, Philadelphia, PA 19103. 215-564-2929. 1 copy free.

CAREERS IN MATHEMATICS. (1982) Mathematical Association of America, 1529 18th St NW, Washington, DC 20036.

CAREERS IN MATHEMATICS. American Mathematical Society, PO Box 6248, Providence, RI 02940. 401-272-9500. 1 copy free.

CAREERS IN MATHEMATICS. Association for Women in Mathematics, Box 178, Wellesley College, Wellesley, MA 02181. 617-235-0320 x.2643. Free (two stamps requested).
Describes several mathematical specialties and provides a brief "road map" of the relationships among different areas of mathematics. Appropriate for high school, college, or general interest.

CAREERS IN OPERATIONS RESEARCH. Operations Research Society of America, Mount Royal & Guilford Aves, Baltimore, MD 21202. 301-528-4146. Up to 3 copies free.

CAREERS IN SCIENCE. Association for Women in Science. 2401 Virginia Ave NW, Suite #303, Washington, DC 20037. $1.50.

CAREERS IN STATISTICS. American Statistical Association, 806 15th St NW, Washington, DC 20005. Up to 25 copies free.
Describes what statisticians do and how to train for a career in statistics, lists US & Canadian schools that offer degrees in statistics.

CAREERS IN STATISTICS. American Mathematical Society, PO Box 6248, Providence, RI 02940. 401-272-9500. 1 copy free.

CAREERS IN THE QUALITY SCIENCES. American Society for Quality Control, 161 W Wisconsin Ave, Milwaukee, WI 53203.

THE CASUALTY ACTUARY. Casualty Actuarial Society, One Penn Plaza, 250 W 34th St, New York, NY 10119. Free.

CATALYST: CAREER OPTIONS SERIES FOR UNDERGRADUATE WOMEN. Catalyst, 14 E 60th St, New York, NY 10028.
A series of career opportunity booklets, including information on educational background, training, salaries, working conditions, and status of women. Two examples: "Launching a Career," "Considering a Career in Engineering."

CHOICES: A TEEN WOMAN'S JOURNAL FOR SELF-AWARENESS AND PERSONAL PLANNING, by Mindy Bengham, Judy Edmondson, and Sandy Stryker. (1983) Advocacy Press, PO Box 236, Santa Barbara, CA 93102.
A workbook to help young women sort out their personal and career options against cultural myths and realities.

COST ACCOUNTANT. (1979)
MATHEMATICIANS. (1980)
PROGRAMMER. (1980)
STATISTICIAN. (1978)
Careers Inc., PO Box 135, Largo, FL 33540.

DIRECTORY OF CAREER RESOURCES FOR WOMEN. Ready Reference Press, PO Box 5879, Santa Monica, CA 90405.

EMPLOYMENT OUTLOOK FOR EDUCATION AND RELATED OCCUPATIONS. S/N 029-001-02337-5.
EMPLOYMENT OUTLOOK FOR MATHEMATICS AND RELATED OCCUPATIONS. S/N 029-001-02347-2.
EMPLOYMENT OUTLOOK FOR OFFICE MACHINE AND COMPUTER OCCUPATIONS. S/N 029-001-03221-6.
OCCUPATIONAL OUTLOOK HANDBOOK.
Superintendent of Documents, US Government Printing Office, Washington, DC 20402.
Lists several hundred occupations, the number employed, anticipated annual openings, and statement of employment trends. Revised frequently.

FACTS ON COMPUTER CAREERS
A LOOK INTO COMPUTER CAREERS.
American Federation of Information Processing Societies, 1899 Preston White Dr, Reston, VA 22091.

I CAN BE ANYTHING: CAREERS AND COLLEGES FOR YOUNG WOMEN, by Joyce Slayton Mitchell. (1975) College Board Publication Orders, Box 2815, Princeton, NJ 08540.
One page descriptions of careers, including education and training required, status of women in field, salaries, colleges awarding bachelor's degrees in the field, and addresses for further information. Photos depict women using tools of their trade or profession.

"I'M MADLY IN LOVE WITH ELECTRICITY" AND OTHER COMMENTS ABOUT THEIR WORK BY WOMEN IN SCIENCE AND ENGINEERING, by Nancy Kreinberg. (1977) EQUALS, Lawrence Hall of Science, University of California, Berkeley, CA 94720. 415-642-1823. $2 plus 50¢ postage (make out check to The Regents, U of CA).

Quoted comments from 70 women about the work they do in private corporations, government laboratories, community colleges, and universities.

MATH AND YOUR CAREER. (1976) US Department of Labor, Bureau of Labor Statistics.

Includes lists of government bulletins about careers requiring varying levels of math. Other leaflets on career areas are *English and Your Career*, *Science and Your Career*, and *Mechanics and Your Career*.

MATHEMATICIANS. 5-990258
OPERATIONS RESEARCH ANALYSTS. 5-990392
Science Research Associates, Inc, 155 N Wacker Dr, Chicago, IL 60606.

Each four-page brief includes a description of the individual job including qualifications and training, earnings, and outlook, plus selected references.

MATHEMATICS TEACHING AS A CAREER. (1979) National Council of Teachers of Mathematics, 1201 16th St NW, Washington, DC 20036. 703-620-9840.

Answers questions about duties, benefits, and opportunities in the teaching of mathematics.

NATIONAL REFERRAL CENTER, Library of Congress, Washington, DC 20540. 202-842-2170.

Free referral service which directs those with questions about careers to organizations that can provide answers.

OCCUPATIONAL INFORMATION MONOGRAPH -- MATHEMATICIAN. Guidance Center, Faculty of Education, University of Toronto, 252 Bloor St, West Toronto, ON M5S 2Y3, Canada.

Other mathematics-related career briefs also available.

PHYSICS: A CAREER FOR YOU? (1977) American Institute of Physics, Publication R-279, 335 E 45th St, New York, NY 10017.

PHYSICS IN YOUR FUTURE. (1982) The American Physical Society, 335 W 45th St, New York, NY 10017. Single copies free.

PLANNING YOUR CAREER.
SO YOU WANT TO GO TO WORK. (1983)
TAKE IT FROM US.– YOU CAN BE AN ENGINEER. (1982)
WHAT'S IT LIKE TO BE A TECHNICIAN? (1983)
WHAT'S IT LIKE TO BE AN ENGINEER? (1983)
WHAT'S IT LIKE TO WORK IN THE BUSINESS WORLD?
WHAT'S IT LIKE TO WORK WITH COMPUTERS? (1983)
Educational Communications Programs, General Electric Company, Fairfield, CT 06431.

Publications designed for junior and senior high school students, represent various occupations and the training they require.

PROFESSIONAL OPPORTUNITIES IN THE MATHEMATICAL SCIENCES. (1983) Mathematical Association of America, 1529 19th St NW, Washington, DC 20036. $1.50 ppd.

Detailed information about careers in different aspects of the mathematical sciences. 41 pp.

A PROFILE OF THE WOMAN ENGINEER. Society of Women Engineers, United Engineering Center, Room 305, 345 E 47th St, New York, NY 10017. 212-705-7855.

Statistical information about women in engineering: educational, employment, and salary information and general characteristics.

PROFILES IN APPLIED MATHEMATICS. Society for Industrial and Applied Mathematics, 117 S 17th St, Suite #1400, Philadelphia, PA 19103. 215-564-2929. 1 copy free.

Descriptions of 17 companies that hire applied mathematicians and the types of work performed.

SCIENCE AND ENGINEERING CAREERS – A BIBLIOGRAPHY. (1974) Scientific Manpower Commission, 1776 Massachusetts Ave NW, Washington DC 20036.

SCIENCE EDUCATION FOR YOU? (471-14688) (1975) National Science Teachers Association, 1742 Connecticut Ave NW, Washington, DC 20009.

THE SKY'S THE LIMIT IN MATH-RELATED CAREERS, by Judy Askew. (1981) Educational Development Center, Newton, MA.

44 page booklet describing math related jobs in computers, engineering, finance, education, research mathematics, and statistics. Quotes women in these areas. Includes a resource list of women who may be contacted with questions.

SPACE FOR WOMEN. (1985 update) Public Information Office, Smithsonian Astrophysical Observatory, 60 Garden St, Cambridge, MA 02138.

Derived from a 1975 symposium for women on careers in astronomy, astrophysics, and earth and planetary sciences. Discusses choosing a career in space science and the problems and benefits of a dual role for women -- marriage and a career. The interdisciplinary nature of science and the importance of parallel careers – programmer, scientific librarian, and secretary -- are well presented.

STATISTICIAN. (1978) Careers, Inc., PO Box 135, Largo, FL 33540. 65¢ ppd.

STATISTICS AS A CAREER: WOMEN AT WORK. (1984) Committee on Women in Statistics, American Statistical Association, 806 15th St NW, Washington,
DC 20005. Up to 25 copies free.

Career information with pictures and brief descriptions of female statisticians.

WHAT ARE YOU DOING FOR THE REST OF YOUR LIFE? IS ENGINEERING FOR YOU? Society of Women Engineers, 345 E 47th St, New York, NY 10017. 212-705-7855.

WHAT'S IT LIKE TO WORK WITH COMPUTERS? Educational Communications Programs, General Electric Company, Fairfield, CT 06431. 1 copy free.

WOMEN AND STATISTICS. American Statistical Association, 806 15th St NW, Washington, DC 20005. Up to 25 copies free.

WOMEN ENGINEER. (1974) Engineers' Council for Professional Development, 345 E 47th St, New York, NY 10017.

WOMEN IN PHYSICS. (1982) American Physical Society, Committee on the Women in Physics, 335 E 45th St, New York, NY 10017. Free.

Excellent description of various job opportunities in the area of physics, educational requirements, etc. Quotations and pictures of women in physics.

WOMEN IN SCIENCE, by Alice Fins. VGM Career Horizons, 8259 Niles Center Rd, Skokee, IL 60077.

General career information with 10 biographical chapters on women in biology, chemistry, geology, astronomy, physics, mathematics, and computer science. For high school audience. Also a chapter on getting a job.

WOMEN IN SCIENCE AND TECHNOLOGY: CAREERS FOR TODAY AND TOMORROW, by Gail T. McClure. (1976) American College Testing Program, Publications Department, PO Box 168, Iowa City, IA 52240.

Encourages career planning.

YOUR TOMORROW -- A GUIDE TO CAREERS IN THE CHEMICAL INDUSTRY. (1977) American Chemical Society, 1155 16th St NW, Washington, DC 20036.

FINDING EMPLOYMENT:

CAREER OPPORTUNITY INDEX, CAREER OPPORTUNITY UPDATE. Career Research Systems, Inc., PO Box 8969, Fountain Valley, CA 92708.

Listings of employment opportunities and articles about effective job searches.

CPC ANNUAL. College Placement Council, 62 Highland Ave, Belthlehem, PA 18017. (215) 868-1421.

Volume 1 offers advice on how to take stock of your abilities, evaluate potential employers, and present yourself effectively. Volume 3 provides information about employers in technical fields.

EMPLOYMENT OPPORTUNITIES IN GOVERNMENT. Write to the United States Civil Service Commission, Washington, DC 20402.

EMPLOYMENT OUTLOOK FOR MATHEMATICS AND COMPUTER RELATED OCCUPATIONS. (2200-4) US Government Printing Office, Superintendent of Documents, Washington, DC 20402. $2.25.

THE NEXT MOVE: A WORKBOOK IN CAREER PLANNING, by Nelle Scholz. (1979) Kendall/Hunt Publishing Co., Dubuque, IA.

PETERSON'S GUIDE TO ENGINEERING, SCIENCE, AND COMPUTER OPPORTUNITIES. (updated annually) Peterson's Guides, Box 2123, Princeton, NJ 08540.

PROFESSIONAL OPPORTUNITIES IN THE MATHEMATICAL SCIENCES. (1983) Mathematical Association of America, 1529 18th St NW, Washington, DC 20036. $1.50 ppd.

PROFILES IN APPLIED MATHEMATICS. Society for Industrial and Applied Mathematics, 117 S 17th St, Suite #1400, Philadelphia, PA 19103. 215-564-2929. 1 copy free.

Descriptions of 17 companies that hire applied mathematicians and the types of work performed.

SEEKING EMPLOYMENT IN THE MATHEMATICAL SCIENCES, Mathematical Sciences Employment Register, PO Box 6248, Providence, RI 02940. $4.

Provides information about mathematical employment and required preparation, gives suggestions for looking for and applying to positions. 22 pp.

WHAT COLOR IS YOUR PARACHUTE? by Richard N. Bolles. (Updated annually) Ten Speed Press, Berkeley CA.

Excellent guide to career/life planning.

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OTHER BIBLIOGRAPHIES ON WOMEN AND MATHEMATICS

The bibliographies listed below contain some overlaps in sources mentioned.

AWIS-CAC COMPILATION OF RECOMMENDED CAREER GUIDANCE RESOURCES. Association for Women in Science, 2401 Virginia Ave NW, Suite 303, Washington DC 20037. 202-833-1998. $2.
Lists books, films, curricular materials, etc.

BIBLIOGRAPHY ON CAREERS IN MATHEMATICS AND RELATED FIELDS. Society of Industrial and Applied Mathematics (SIAM), 1405 Architects Building, 117 South 17th St, Philadelphia, PA 19103.

CAREER INFORMATION SYSTEM (CIS), 217 Hendricks Hall, University of Oregon, Eugene, OR 97403. 503-686-3872.
Consortium compiles career information and provides it to schools, social agencies, and individuals in usable forms.

ERIC (EDUCATIONAL RESOURCES INFORMATION CENTER). Clearing House for Science, Mathematics, and Environmental Education, Ohio State University, 1200 Chambers Rd, 3rd floor, Columbus, OH 43212. (614) 422-6717.
Comprehensive listing of publications, especially government publications, related to math education.

EQUALS: AN ANNOTATED BIBLIOGRAPHY TO ASSIST ELEMENTARY AND SECONDARY SCHOOL TEACHERS IN SEX-FAIR COUNSELING AND INSTRUCTION, by Valerie Wheat. (August 1977) Equals Institute, Laurence Hall of Science, University of California, Berkeley, CA 94720.

GAMMA BIBLIOGRAPHY. (1984) Girls and Mathematics Association (GAMMA), c/o Girls and Mathematics Unit, University of London Institute of Education, 58 Gordon Square, London WC1H ONT, England.
Detailed bibliography includes many research papers and periodical articles.

HANDBOOK FOR CONDUCTING EQUITY ACTIVITIES IN MATHEMATICS EDUCATION. (1984) National Council of Teachers of Mathematics, 1906 Association Dr, Reston, VA 22091.

NATIONAL REFERRAL CENTER, Library of Congress, Washington, DC 20540. 202-842-2170.
Free referral service which directs those with questions about careers to organizations that can provide answers.

RESOURCES FOR EDUCATIONAL EQUITY. (1985 Catalog) Women's Educational Equity Act Program, 55 Chapel St, Newton, MA 02160.

WOMEN AND MATHEMATICS EDUCATION 1985-86 RESOURCE LIST. Judith E. Jacobs, Education Dept, George Mason University, Fairfax, VA 22030.

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